UNITED DATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

CHRIMAR SYSTEMS, INC. d/b/a CMS TECHNOLOGIES, INC./ a Michigan Corporation, Plaintiff, v. FOUNDARY NETWORKS, INC., a California Corporation, Defendant.	Civil Action No. 06-13936 Honorable Avern Cohn

REPORT AND RECOMMENDATION OF EXPERT ADVISOR TO THE COURT REGARDING FOUNDRY NETWORKS, INC.'S MOTIONS FOR SUMMARY JUDGMENT OF INVALIDITY

DRAFT Version 3 (version 3 issued: 03/18/12)

On October 28, 2011, I was appointed by the Court to serve as an Expert Advisor to research, analyze, and draft a decision regarding Foundry's motion for summary judgment of invalidity of claims 14 and 17 of U.S. Patent No. 5,406,260 (the "'260 Patent"). For the reasons stated below, I recommend that the Court GRANT Foundry's motion for summary judgment of invalidity of claims 14 and 17.

I. Background

This civil litigation involves U.S. Patent No. 5,406,260 (the "'260 Patent"), which is being heard in the U.S. District Court, Eastern District of Michigan by the Honorable Avern Cohn. The asserted claims of the '260 Patent cover a Network Security System for

Detecting Removal of Electronic Equipment. Judge Cohn also presided over an earlier case, Chrimar Systems, Inc. v. Cisco Systems, Inc. ("Cisco"), that involved the same Plaintiff, Chrimar Systems, Inc., the same patent and many of the same issues. In Cisco, the Court issued a decision in 2004 (318 F. Supp. 2d 476) finding that (1) paradigm claim 1 of the '260 Patent was invalid by anticipation (with the FDDI Publications being the prior art), and (2) that Cisco's accused network devices (i.e., IP Phones, Inline Power Switches, and Power Patch Panels) did not infringe claim 1 of the '260 Patent.

On January 3, 2007, Plaintiff Chrimar Systems, Inc. ("Chrimar") filed an instant patent infringement action against Defendant Foundry Networks LLC ("Foundry") alleging infringement of the '260 Patent. Chrimar alleges that Foundry's PoE (Power over Ethernet) switches [1] infringe on claims 14 and/or 17 of the '260 Patent.

A Special Master, Professor Mark A. Lemley, held a *Markman* hearing on March 6, 2008 in California and issued a report and recommendation to the Court on April 1, 2008 (Doc. 53, filed 04/01/08). The Court adopted the recommendations of the Special Master for 12 of the 13 disputed terms of claims 14 and 17 in their entirety (and for one of the terms, term 3: "selecting respective pairs", the Court made a minor grammatical change) and issued a *Markman* order dated July 30, 2008 (Doc. 69). The Court filed the associated Memorandum of Claim Construction (Doc. 70) on July 30, 2008. Chrimar filed a motion (Doc. 71, 08/13/08) for reconsideration or clarification of the Court's *Markman* order relating to the phrase "current loop," and the Court stayed the motion (Doc. 76, filed 10/02/08). [2]

On October 5, 2009, Foundry made motions (Doc. 84 and 85) for the application of collateral estoppel (based on the Cisco ruling) to claims 14 and 17 with respect to noninfringement and the meaning of the term "data communication lines", which was interpreted in the body of the Cisco ruling as meaning "lines that are typically used for carrying data." On October 6, 2009, the Foundry made a further motion (Doc. 89) for the application of collateral estoppel (based on Cisco) to bind Chrimar to fact issues decided (1) regarding the "Green Book" and the "AMD Application Note" (collectively none as "FDDI Publications") and (2) the invalidity of claim 1 of the '260 Patent by anticipation by the FDDI Publications.

The Special Master, Professor Lemley, wrote reports (Doc. 112, filed 12/16/09 and Doc. 127, filed 12/16/09) and made recommendations to the Court regarding these two motions. Specifically, the Special Master recommended that Foundry's motion for the application of collateral estoppel with respect to the term "data communication lines" be denied, since in Cisco, a judgment of noninfringement of the accused devices could be rendered on the absence of either of two claim elements, i.e., "data communication lines" or "detector means" individually. [3] The recommendation was made without prejudice to any later motion for summary judgment of noninfringement of claims 14 and 17 based on its merits. Professor Lemley further recommended that collateral estoppel (based on Cisco) bind Chrimar to fact issues decided regarding the "Green Book" and the "AMD Application Notes" and the invalidity of claim 1 of the '260 Patent based on this prior art. Along with his report, he listed 38 specific findings (Doc. 127, Appendix A) from the Cisco litigation to which, he recommended that collateral estoppel should be applied. The Court adopted these two recommendations regarding the application of collateral estoppel (Doc. 139) on August 8, 2010.

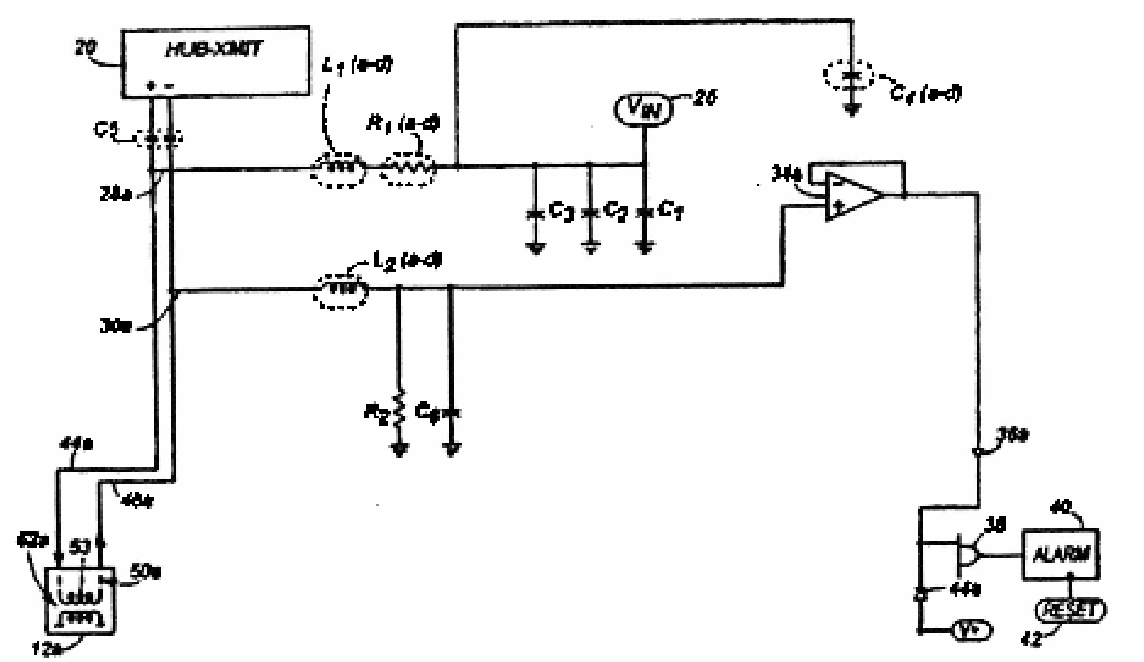
Foundry made a motion for summary judgment of invalidity (Doc. 143) and noninfringement (Doc. 168) of claims 14 and 17 on September 17, 2010. The Court-appointed Special Master, Professor Mark A. Lemley, issued a report and recommendation (Doc. 210) to the Court regarding Foundry's motion for summary judgment on May 2, 2011. The report recommended that Foundry's motion for summary judgment of invalidity of claims 14 and 17 be granted, and that the Foundry's motion for summary judgment of noninfringement of claims 14 and 17 be denied.

Both Foundry and Chrimar objected to many of the report's findings and recommendations. A hearing of these objections was held on October 28, 2011 in the Court of the Honorable Avern Cohn. The Court ordered that no additional documents were to be filed by either Chrimar or Foundry until further notice. Under the inherent authority of the Court, I was appointed as Expert Advisor to Judge Cohn. As an Expert Advisor, I was asked by the Court to research, analyze and draft a recommendation regarding the invalidity of claims 14 and 17 of the '260 Patent.

I.A. '260 Patent

The '260 Patent discloses a system for monitoring the removal of peripheral equipment (e.g., computer workstations) from local area computer networks (LANs), and is discussed in depth in the Court's memorandum opinion *Chrimar Systems, Inc. v. Cisco Systems, Inc.*, 318 F. Supp. 2d 476 (E.D. Mich. 2004). The '260 Patent discloses an inexpensive technique, which uses pre-existing network data communication lines, to detect when peripheral equipment is removed from a local area network.

In the preferred embodiment **(see Exhibit 1** and Figure 1 below**)**, data communication lines (44a and 46a) are coupled to the communication electronics inside peripheral equipment (12a) via an isolation transformer (52a), also located inside the



Chrimar Systems, Inc. v. Cisco Systems, Inc., 318 F. Supp. 2d 476 (E.D. Mich. 2004)

peripheral equipment. In the preferred embodiment, a low DC current (produced by DC voltage source 25), originating from a source (25) at a remote location, passes through a pair of existing data communication lines (44a and 46a) already connecting a network hub (20) to the peripheral equipment. The current flows from the remote location along one of the data communication lines (44a), passes through the primary windings (53) of the isolation transformer (52a) inside the peripheral equipment (12a), and returns to a detector (resistor R_2, attached to data line (46a)) at the remote location. The closed-loop path (i.e., $25 \rightarrow 28a \rightarrow 44a \rightarrow 53 \rightarrow 46a \rightarrow 30a \rightarrow R_2 \rightarrow \text{ground}$) along which the DC current flows is called a current loop (50a). Since the applied voltage (25) is constant in the preferred embodiment, the current flow is also constant (and hence continuous) in the current loop (50a) of the preferred embodiment as long as the peripheral equipment remains attached to the communication lines (44a and 46a).

The DC current does not affect the data communications to (from) the peripheral equipment (12a) from (to) the hub (20) because (1) constant, non-time-varying signals cannot pass through from the primary windings (53) to the secondary windings of the isolation transformer (52a), (2) a bank of capacitors (C5) prevents the DC signal from entering the hub equipment, and (3) the DC current is sufficiently low so as not to interfere with the data signals even if a small amount of the DC current "leaks" through the primary windings (53) to the secondary windings of the isolation transformer (52a). If the peripheral equipment (12a) is removed from the local network (once the DC current has been established and is flowing in the current loop (50a)), by either disconnecting or by severing the attached data communication wiring (44a or 46a), then DC current in the loop (50a) is interrupted and goes to zero. This change in the DC current can be detected at a remote location (using detector means resistor R_2, shown attached to data line 46a), and can activate an alarm (40) to alert personnel that a disconnect of the peripheral equipment (12a) has occurred. The preferred embodiment of the '260 invention is a security system for detecting theft or the unauthorized disconnection of peripheral computer equipment, such as computer workstations. A *Markman* order dated July 30, 2008 (Doc. 69), however, ruled that the terms "unauthorized disconnection" in the preamble to claim 14 was not limiting. [4].

Although the stated purpose of the '260 invention is to detect the disconnection of peripheral equipment, it is obvious that the invention can also detect whether the data communication lines (44a and 46a) are broken, disconnected and/or improperly connected. In all three of these cases, no DC current will flow in the current loop (50a). As a result the voltage drop across resistor R_2 (attached to data line 46a) will be zero. Thus a measurement of this voltage drop at the remote location can be used to determine whether the data communication lines are broken, disconnected and/or improperly connected. Such a measurement, however, cannot distinguish between these three different cases. Furthermore for the device to perform this cable detect function, a continuous current need not be established in the current loop (50a) beforehand, a simple measurement of a zero voltage drop across R_2, rather than a voltage change, is sufficient. Finally, I note that although the claims 1 and 14 of the '260 Patent refers to "..detecting a change in said current signal.." or "..detect a change in current flow..", respectively, Fig. 2 of the preferred embodiment of the '260 Patent **(see Exhibit 2)** shows an implementation that detects the voltage across resistor R_2 (or equivalently the current in the current loop) rather than a <u>change</u> in voltage (or equivalently a change in current). Unless the alarm (40) itself is constructed to specifically monitor a voltage change (as opposed to a voltage level), a zero voltage drop across resistor R_2 will be sufficient to trigger the alarm (40).

At the time this patent was filed (Dec. 18, 1992), 10BASE-T Ethernet, a local area network technology, had already been standardized by the IEEE as IEEE 802.3i. The '260 Patent **(see Exhibit 2)** refers to the terms "10BASET" and/or "Ethernet" in the abstract, the preferred embodiment (col. 3 18:19, col.3 34:35) and in claims 4, 11, 17 and

18. Col. 3 17:19 of the ‘260 patent states that “The computer network **10** may include most any type of backbone such as, for instance, an Ethernet backbone manufactured by Xerox Corporation.” Thus the patent discloses that the invention may be used with an Ethernet network, though it is not limited to such networks. It is important to observe that the disclosed invention does not provide any details related to the network hub equipment or the peripheral equipment, including the network interface cards and the associated transceivers. [5]

In practice, the hub equipment would contain a transceiver (which could be a modular plug-in board) that would convert binary data streams (i.e., streams of bits) to electrical signals and vice versa. The electrical signals would travel along a pair of transmit (receive) wires to (from) the peripheral equipment. Similarly the peripheral equipment would contain a transceiver connected to the secondary winding of the isolation transformer (52a). The transceiver would be designed to meet the required signaling specifications (e.g., IEEE 802.3i Ethernet 10BASE-T or ANSI X3T9.5 CDDI). The transceiver may also contain the electronics necessary to match the impedance of the electrical cable that connects the hub to the peripheral device.

The ‘260 Patent does not discuss or address the required transceiver electronics. Thus the phrase “10BaseT wiring” appearing in dependent claim 17, which reads:

> 17. “The method as defined in claim **14** wherein said existing data communications lines comprise 10BaseT wiring.”

could just as well been replaced by “FDDI over copper” or any other type of wiring without making <u>any</u> additional changes to the patent. Thus the invention disclosed in the ‘260 patent is completely independent of the wiring, as well as the type of network, to be used with the invention. This fact raises the issue of whether claim 17 is invalid based on obviousness. I will address this point in detail in section III of this report.

I.B. Local Area Networks

In the 1980's and the early 1990's, there were three popular local area network (LAN) technologies in the workplace. The first was Ethernet LANs (either with coaxial cable or twisted pair wiring), a technology based on a random access protocol. The second were token-passing systems - either IBM Token Ring, utilizing twisted pair wiring, or Fiber Distributed Data Interface (FDDI), utilizing optical fibers. Today, almost all LANs are based on advanced Ethernet technologies, and token ring systems are nearly extinct.

I digress briefly to discuss Ethernet and token ring LAN technologies so that the disputes regarding the '260 Patent can be placed in their proper prospective.

I.B.1. Ethernet

In the 1970's Xerox was interested in finding a way to share their expensive printers between computer workstations using a shared communication mechanism. This shared communication mechanism became known as the Ethernet and was developed at Xerox PARC between 1973 and 1974. The basic communication concept was documented in an internal Xerox PARC memo authored by Robert Metcalfe on May 22, 1973, and a patent application (U.S. Patent No. 4,063,220) for Ethernet technology was filed in 1975. In 1976 Robert Metcalf and David Boggs described and analyzed their Ethernet system in a seminal paper entitled "Ethernet Distributed Packet Switching for Local Computer

Networks," and in 1977 U.S. Patent No. 4,063,220 was issued to R. Metcalfe, D. Boggs, C.P. Thacker and B. W. Lampson of Xerox PARC.

In a LAN, multiple peripheral devices share a common transmission medium. Thus, if more than one peripheral device attempts to transmit at the same time, a "collision" will occur. In the Ethernet protocol, the individual peripheral devices can detect a collision, and each device, after waiting a random amount of time, will retransmit its frame of data. The retransmission process will be repeated as many times as is necessary, until all of the peripheral devices have sent their frames of data successfully without collision. In order to reduce congestion, each peripheral device will vary the amount of its random delay in order to adapt to the number of collisions it encounters.

Ethernet was originally called *Alto Aloha Network Protocol* or "*ALOHAnet.*" In 1979 DEC and Intel joined forces with Xerox to write a standard for the Ethernet. This was referred to as the *DIX standard*, and the publication was called the *Ethernet Bluebook*. Ethernet was defined at the time as a 10 Mbps protocol running over coaxial cable using CSMA/CD (carrier sense multiple access/collision detect) for transmission. In 1983, the IEEE released their version of the Ethernet standard, IEEE 802.3 10Base5 "Thicknet". IEEE 802.3 10Base5 was largely based on the DIX standard, but it had significant changes in the frame format. It was, however, backward compatible with the DIX standard. In 1985, IEEE updated the IEEE 802.3 standard to include "Thinnet" (IEEE 802.3 10Base2) which could also support 10 Mbps but using a thinner, lower cost, coaxial cable. In general, coaxial cable is expensive and bulky compared with most other forms of wiring.

I.B.2. Token Ring

Token rings have a token-passing bus topology for the Physical and Data Link layers of a network. As described in section I.B.1., an Ethernet LAN will share the transmission medium by detecting collisions and retransmitting as necessary. Token rings networks, on the other hand, use a token-passing scheme to decide when the transmission medium is available. A special packet, called a token is passed around the ring from network node to network node. When a node requires access to the ring, the node claims the token, and then passes its information packet around the ring. All nodes read the destination address of this packet, and if it is not addressed for them, the information packet is then passed to the next node. When the destination node reads the packet, it marks it as read, and passes it to the next node. When the information packet completely circulates around the ring from node to node and arrives back at the source node, the source node then releases the token back on to the ring allowing another node to access the ring. A token ring LAN is physically wired in a star topology, with a central hub and arms radiating from the hub out to each node. A loop passes through the hub going out and back through each node to form a logical ring.

The token ring technology was originally developed by IBM in 1984 for their PC local area networks (LANs). In 1984 IBM also introduced a shielded twisted pair (STP) cabling system (not coaxial) and associated connectors (known as IDC: IBM Data Connectors), commonly known as IBM Type 1 and Type 2 cabling (**see Exhibit 6**). This new wiring system was compatible with IBM's communication product line, including their new token ring system. IBM's Token Ring is the basis for the IEEE 802.5 Token Ring Network standard first issued in 1985.

Originally the IBM token ring could only support data rates of 4 Mbps, but in 1989 IBM introduced the first 16 Mbps token ring system. The original IEEE 802.5 standard was extended to include this 16 Mbps system in 1989. Physical layer specifications for token ring systems are not precisely standardized, and in fact the IEEE 802.5 document contains no physical layer specifications at all. Cabling guidelines are derived from the systems established by IBM, and they can differ from equipment made by other manufactures.

Attachment points (i.e., nodes or hubs) along the ring are referred to as concentrators or MAU's (multi-station access units). Concentrators generally contain a number of ports, allowing (1) one concentrator to be connected to another concentrator, and (2) allowing a number of pieces of peripheral equipment (e.g., computer workstations) to be connected to the concentrator. Each concentrator has a "Ring In" and a "Ring Out" port. A cable (known as a patch cable) connects the Ring Out port to the Ring In port of the adjacent concentrator along the ring. If the cable connecting two adjacent concentrators along the ring is removed, then the ring becomes "broken" and operation is no longer possible. Generally concentrators will automatically "wrap" the Ring In and Ring Out ports together when no connector is inserted into these ports, thus "looping back" and sealing the ring so that it can continue to operate. Certain connectors, such as the IBM IDC connectors, can perform this ring "wrapping" function automatically when disconnected. Each concentrator port can have its own connector type (e.g., IDC, RJ-45, DB-9 or RJ-11).

Peripheral devices, such as computer workstations, are connected to the concentrators via loop cables. Each peripheral device contains a NIC (network interface card, which is sometimes also called an adapter) that serves as an electronic interface between the peripheral device and the data cable connecting it to a concentrator. The NIC contains a transceiver, that converts binary data streams (i.e., streams of data bits) to electrical or optical signals that are transmitted over the data communication lines (between peripheral device and hub) and vice versa. Similarly, each concentrator also contains a transceiver.

I.B.3. Fiber Distributed Data Interface (FDDI)

In the late 1980's, high-speed engineering workstations were beginning to tax the bandwidth of existing copper-based Ethernet and Token Rings wiring systems. This led to the development of token ring technology that operated at high speeds (i.e., 100 Mbps data rates) connecting hundreds or thousands of peripheral devices using optical fiber media rather than electrical cables. This new technology came to be known as the Fiber Distributed Data Interface (FDDI). An FDDI standards (ANSI X3T9.5) was originally issued in 1989, and FDDI networks were deployed. The FDDI physical topology **(see Exhibit 7)** used a dual redundant ring of optical fibers, with data on each ring flowing in opposite directions. During normal operations, the primary ring is used for data transmission, and the secondary ring remains idle. The main purpose of the secondary ring is to provide backup in case of a failure of the primary ring. FDDI defined three categories of devices that could be attached to the ring – concentrators, single attachment stations (SAS), and dual attachment stations (DAS). A SAS attached only to the primary ring through a concentrator, and a SAS will have no affect on the FDDI ring if disconnected or powered off. A DAS attaches to both the primary and secondary fibers using two ports A and B. Unlike a SAS, the FDDI ring will be affected if a DAS is either removed or powered off. The concentrator ensures that the removal, failure, or power-down of any SAS connected to it does not affect the FDDI ring. If either a concentrator or a DAS is removed from the ring, the ring must be "sealed" to provide a continuous path. Peripheral devices, such as computer workstations, are SAS that connect to a concentrator giving them access to the data network. A master port (M port) on the FDDI concentrator is attached to a slave port (S port) on the peripheral device. **(see Exhibit 8, Figure 1)**

I.B.4. <u>Copper Distributed Data Interface (CDDI)</u>

FDDI systems can operate over greater distances and at higher speeds than copper-based systems, but they are more expensive. Connections between peripheral equipment and concentrators, however, may be short runs that don't require the operating high speed of the fiber optic ring backbone that connects concentrators to concentrators. It is a costly investment to install optical fiber in buildings that are already equipped with shielded copper wiring like IBM Types 1 and 2. Thus it would be cost effective to use fiber for the longer distance backbone, while using copper wiring to connect peripheral equipment to concentrators. In May 1991, a proposal for using FDDI equipment with shielded twisted pair (STP) cable, rather than optical fiber, was developed by Advanced Micro Devices (AMD), Chipcom Corp., Digital Equipment Corp. (DEC), Motorola, Inc., and SynOptics Communications. This FDDI system based on shielded or unshielded, twisted pair copper wiring, rather than fiber, eventually became known as Copper Distributed Data Interface (CDDI). CDDI can support high data rates, but not long distances (i.e., < 100 m for CDDI vs. 200 km of FDDI). The group's proposal, known as the "Green

Book," was presented to the ANSI (American National Standards) X3T9.5 Working Group, and it was incorporated into the ANSI X3T9.5 FDDI standard in 1994. It was expected that companies would produce new chip sets/transceiver modules that could be installed in existing FDDI concentrators to allow the M-port of a concentrator to be connected via wire cable to the S-port of a peripheral device or to the S-port a second concentrator. Indeed such chip sets/transceivers supporting FDDI over both shielded and unshielded copper wiring were eventually developed and made commercially available. (see Advanced Micro Devices, Publication# 18258 Rev. A, Issue Date Nov. 1993, "Implementing FDDI OVER Copper; The ANSI X3T9.5 Standard," Application Note.)

A chronological summary of some of the important LAN developments is given in the table on the next page

1973	Ethernet LAN developed at Xerox PARC
1975	Ethernet LAN U.S. Patent No. 4,063,220 filed
1977	Ethernet LAN U.S. Patent No. 4,063,220 issued.
1983	IEEE releases first Ethernet LAN standard IEEE 802.3
1984	IBM introduces token ring LAN
1984	IBM introduces Type 1 and Type 2 cabling and connectors
1985	SynOptics Communications, Inc. is founded
1985	SynOptics markets its LattisNet Ethernet equipment
1987	SynOptics markets its Ethernet LAN equipment that operates at 10Mb/s over unshielded twisted pair (UTP) wiring and also includes a link status

	function
1989	ANSI issues it ANSI X3T9.5 standard for FDDI token ring LAN systems
1990	IEEE issues its 10Base-T 802.3i Ethernet standard for unshielded twisted wire pairs
May 21, 1991	Green Book is issued
November 1991	EIA/TIA Technical System Bulletin TSB-36: Additional Cable Specifications for Unshielded Twisted Pair Cables is issued
December 18, 1992	‘260 Patent is filed
1994	CDDI token ring adopted as part of the ANSI X3T9.5 FDDI standard
April 11, 1995	‘260 Patent is issued

Chronological Summary of Important Early LAN Developments

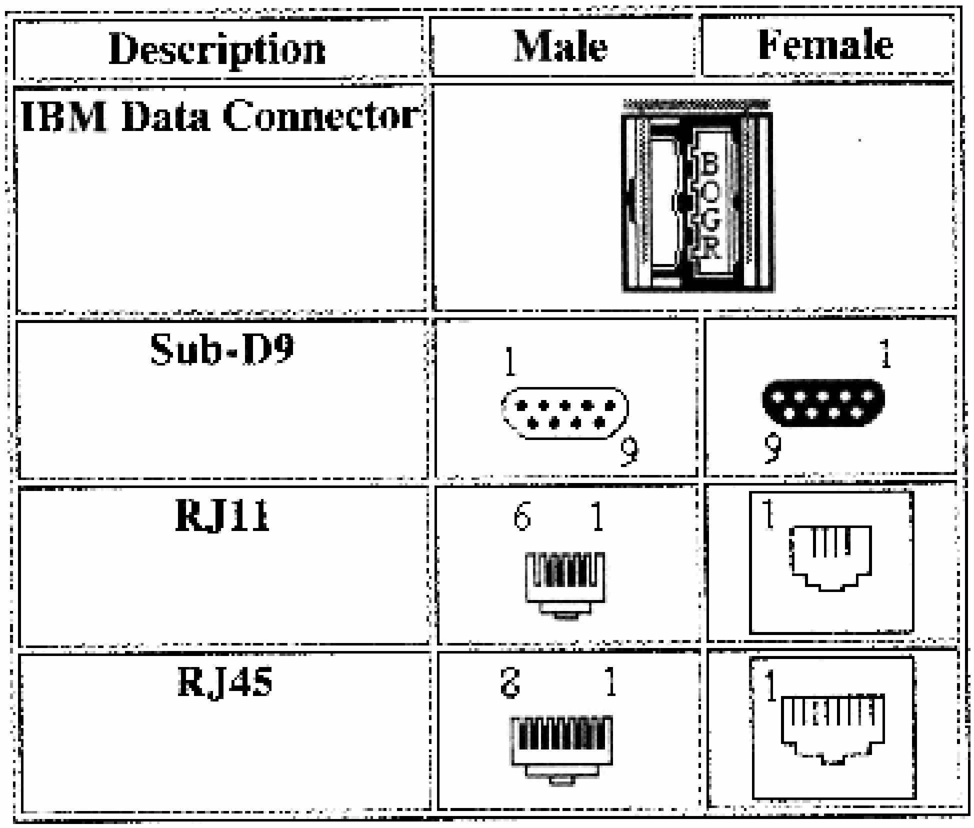
I.C. Ethernet and Token Ring Cabling

The ‘260 Patent refers to Ethernet and 10BaseT wiring, and the meaning of the later term, which appears in claim 17, is highly disputed by the litigants, and thus I discuss wiring, cabling [6] and connectors at some length below.

I.C.1 IBM Type 1 and Type 2 Cabling and Connectors

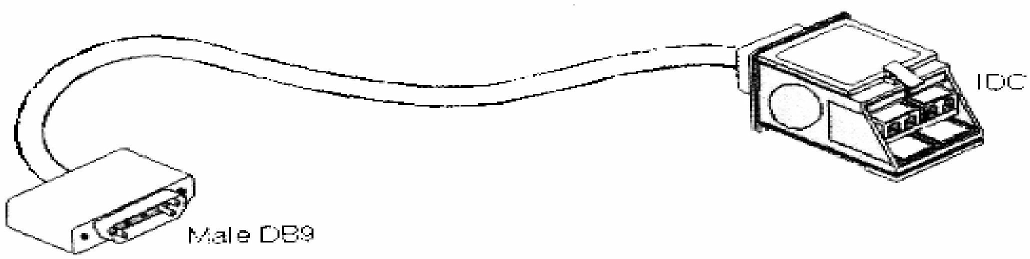
In the 1980’s, electrical LAN cabling emerged to support the first computer networks beginning to appear in commercial building space. The first networks were typically IBM Token Ring systems, which were standardized as IEEE 802.5 in 1985. Cabling for the Token Ring network consisted principally of IBM Type 1 and Type 2 cable mated to unique hermaphroditic connectors (IDC: IBM Data Connector), also known as IEEE 802.5 Medium Interface Connectors (MIC). **(see Exhibit 6)** IBM Type 1 cable consists of 2 loosely twisted, foil shielded, 150 ohm characteristic impedance, 22 AWG solid copper wire pairs surrounded by an overall braid. Type 2 cable is the same as Type 1 cable, except that it also contains four twisted pairs of unshielded, 22 AWG, solid copper conductor for telephones. These cables/connectors were the optimum choice for the support of first generation LAN technologies for several reasons. Their design took advantage of twisted-pair transmission protocol's ability to maximize distance and data rate (IBM Token Ring supported data rates of 4 Mbps and 16 Mbps) using cost effective transceivers. In addition, the foils and braid improved crosstalk and electromagnetic compatibility (EMC) performance to levels that could not yet be realized by early generation twisted-pair wire design and manufacturing. The IBM cables and connectors were widely used, but they were both expensive and large (especially the hermaphroditic connectors) compared with twisted pair wiring already installed in many buildings.

FDDI concentrators contain multiple ports, and each port can have its own connector type. Today the four most common connector types are the 4 blade, hermaphroditic IDC (also known a UDC), the 9 pin subminiature DB-9 connector, the 8 pin RJ-45 connector, and the older 6 pin RJ-11 connector. Each of these connector types utilizes only four pins (or 4 blades) for the IDC, and each pair of pins is associated with a single pair of transmit wires and a single pair of receive wires. The four basic connector types are illustrated below:



Common Token Ring Connectors

Different cables can be interconnected using a variety of adapters (here I don't mean adapters in the sense of NICs), as is also shown in the figures below. Transformer-based adapters (that were available at the time the '260 Patent was filed) are also available to connect 100 ohm unshielded twisted wire cable having an RJ-45 connector to 150 ohm shielded twisted wire cabling having an IDC. These transformer-based adapters also match the impedance difference of the cables, so there is no impedance mismatch at the connection point between the cables (and hence no degradation in system performance).



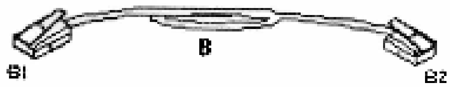
Type 1 IBM Cabling with IDC Connector for MAU and Male DB9 Connector for Peripheral Equipment

IBM Token-Ring RJ-45 STP Adapter cable IBM P/N 60G1063

A1 Connector, adapter end 8-position RJ-45 modular jack
A2 Connector, network end IBM Cabling System Data Connector

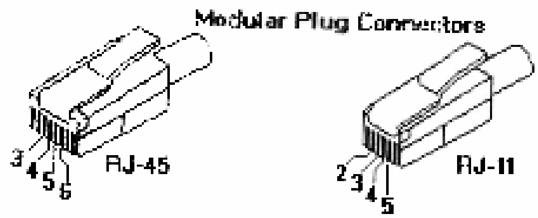
This is used when the adapter has a DB9 port, and the MAU used ICS.

IBM Token-Ring UTP cable Two twisted pairs of UTP cabling.



B1 Connector, adapter end 8-position RJ-45 modular jack
B2 Connector, network end 8-position RJ-45 modular jack or 6 position RJ-11 modular jack

Token Ring - UTP Modular Connector




```
ADAPTER END -- NETWORK END          ADAPTER END -- NETWORK END
 RJ-45       to     RJ-45            RJ-45      to     RJ-11

3 ------------- 3       TD-       3 ------------- 2
4 ------------- 4       RD+       4 ------------- 3
5 ------------- 5       RD-       5 ------------- 4
6 ------------- 6       TD+       6 ------------- 5

,2,7,8          1,2,7,8          1,2,7,8         1,6 <- Not used
```

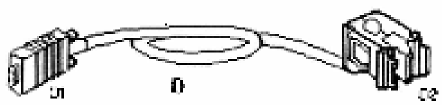
This cable is used when the adapter is RJ45 (or you use a Media Filter) and the Media Access Unit (MAU) is UTP also.

IBM RJ-45 STP/D-Shell Conversion Cable IBM P/N 60G1066
Supplied for use with IBM Token-Ring Network PC Adapter cables

C1 Connector, adapter end 8-position RJ-45 modular plug
C2 Connector, network end 9-position D, male

This adapter plugs into the RJ45 port on the adapter and mechanically changes the cable type to STP for use with the IBM ICS cables.

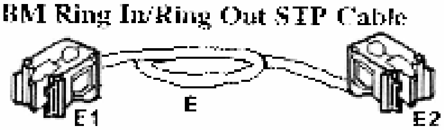
IBM Token Ring Network PC Adapter Cable (STP cable) IBM P/N 6339098



D1 Connector, adapter end 9-position D, male
D2 Connector, network end IBM Cabling System Data Connector or equivalent

These cables are used with adapters that use a DB9 port. For adapters with RJ45 and DB9 ports, the setup gives you the choice of STP (Shielded Twisted Pair, which is the IBM ICS cabling) or UTP (Unshielded Twisted Pair, or Cat3/Cat5 wiring)

IBM Ring In/Ring Out STP Cable

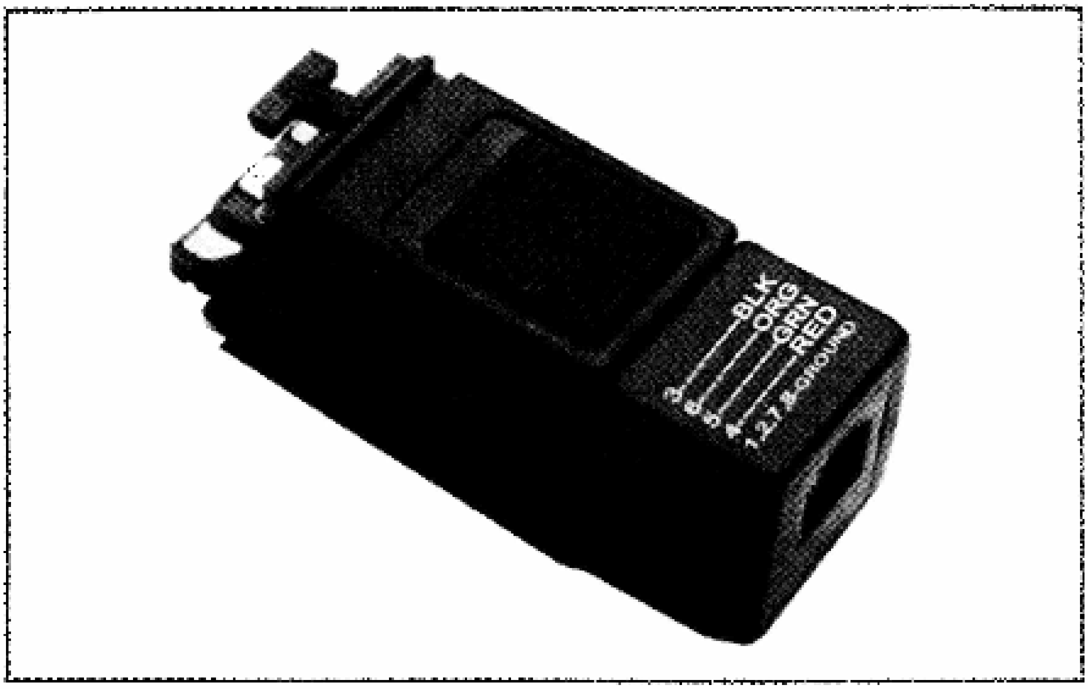


E1 Connector, MAU end IBM Cabling System Data Connector
E2 Connector, MAU end IBM Cabling System Data Connector

These are true hermaphrodite cables, used to link 8228 MAUs together to form a ring.

A Variety of Token Ring Cables and Connectors

206-RJ45-TR



206-RJ45-TR

DATA CONN/RJ45 IMP ADPTR,TOKEN RING

Impedance Matching Adapter Used To Connect 100 Ohm UTP Cabling to 150 Ohm IBM Type 1 Cabling

I.C.2. Twisted Pair Wiring

According to a declaration of Ronald V. Schmidt (Doc. 147-9, filed Nov. 22, 2002), in or around 1985, he and a colleague (i.e., A. K. Ludwick) founded a company that eventually became known as SynOptics Communications, Inc. ("SynOptics") **(see Exhibit 3).** SynOptics was in the business of designing manufacturing, marketing and supporting local area network systems. Ludwick and Schmidt were aware of the fact that the recently introduced IBM Token Ring system, together with Type 1 and Type 2 IBM cabling threatened the emerging Ethernet product line that was created and marketed by Xerox, Digital Equipment Corp., and Intel. Ludwick and Schmidt aggressively responded to this challenge, by developing technology to significantly reduce the cost and complexity of implementing and operating Ethernet computer networks. One of their most successful products was an Ethernet networking system marketed under the name "LattisNet." LattisNet significantly reduced the cost of setting up Ethernet systems by allowing unshielded (UTP) twisted pair wiring, rather than more expensive coaxial cable, to be used. It was also designed for installation in the wiring closets of office buildings using a star topology cabling system.

In the mid-1980's, SynOptics also developed a method to determine whether the cable between peripheral equipment and the network hub (concentrator located in a wiring closet) was properly connected. This link status function is very similar to the invention discussed in the '260 Patent. SynOptics developed, manufactured, and sold LattisNet components in the U.S. as early as 1985. A product (Model 3305 UTP Host Module) that supported Ethernet at 10Mb/s data rates operating over UTP (unshielded twisted pair) wiring as well as having a link status function was released in 1987 **(see Exhibit 3 item**

31). By 1988, SynOptics revenues had reached $40.1 million dollars, up nearly $35 million dollars from the previous year.

By the late 1980's, twisted-pair wire design and manufacturing had progressed to the point where individual foils were no longer required to provide internal crosstalk isolation and overall shields were not necessary to provide immunity against outside noise sources in twisted pair wiring. Thus SynOptics brought to market products that supported 10Base-T Ethernet over unshielded twisted pair wiring (UTP), thus allowing the use of existing telephone wiring in place of coaxial cable or shielded twisted pair (STP) wiring. In 1990, IEEE introduced their IEEE 802.3i standard (IEEE 802.3 10BASE-T) that defined 10 Mbps Ethernet over unshielded twisted pair (UTP) wiring. This standard is described in section I.C.3. below. The lower cost of UTP cabling, firmly established UTP as the cable media of choice for new LANs. LattisNet enjoyed widespread use until the adoption of the IEEE 802.3i industry standard in 1990. Following the adoption of IEEE 802.3i, SynOptics continued to market the original version of LattisNet, but also produced a LattisNet implementation that was compatible with the new standard. In the years following 1990, the Ethernet has continued to evolve to higher and higher data communication speeds, and the IEEE 802.3 standard has been revised accordingly to include these new systems.

I.C.3. Ethernet 10BASE-T Cabling Standard

Section 14 of the IEEE802.3-1990 standard specifies 10BASE-T Ethernet. **(see Exhibit 4)** Subsection 14.1.1.3 (Twisted-Pair Media) states: "The medium for 10BASE-T is twisted-pair wire." The performance specifications of the simplex link segments (i.e., transmit and receive links) are given in subsection 14.4. "This wiring normally consists of 0.4 to 0.6 mm diameter [26 to 22 AWG] unshielded wire in a multiwire pair. The performance specifications are generally met by 100 m of 0.5 mm telephone twisted pair. Longer lengths are permitted providing simplex link segments meets the requirements of 14.4. A length of 100m, the design objective, will be used when referring to the length of a twisted-pair link segment." Subsection 14.4 (Characteristics of the Simplex Link Segment) goes on to specify the transmission and coupling parameters of the wiring, namely (1) insertion loss (14.4.2.1), (2) differential characteristic impedance (14.4.2.2), (3) medium timing jitter (14.4.2.3), (4) delay (14.4.2.4), (5) differential near end cross-talk (14.4.3.1), (6) multiple-disturber next loss (14.4.3.2) and (7) noise environment (14.4.4). It is also noted in subsection 14.4.1 that "The telecommunications Industry Association (TIA) is in the process of developing Standards Proposal No. 1907, Commercial Building Wiring Standard (if approved, to be published as EIA/TIA-568) to expand the application of telephone wiring and typical telephony practices to include LAN applications. When complete, it is expected to provide specifications for media and installation practices suitable for use with this standard."

Note according to the IEEE802.3 10BASE-T standard, the wiring must be chosen to meet the specified characteristics of the simplex link segments (transmit and receive) as given in subsection 14.4, but it need not meet any additional specifications. For example, the standard does not specify the wire material, the wire diameter, twisting rate, insulation, etc.

The connectors are specified in subsection 14.5 (MDI Specification) of the IEEE 802.3i standard as "eight-pin connectors meeting the requirements of Section 3 and

Figures 1-5 of ISO 8877 [16] shall be used as the mechanical interface to the twisted-pair link segment. The plug connector shall be used on the twisted-pair link segment and the jack on the MAU. These connectors are depicted (for informational use only) in Figs. 14-20 and 14-21. The following table shows the assignments of the signals to the connector contacts." The table shows contacts 1 and 2 corresponding to the transmitting pair of lines, and contacts 3 and 6 corresponding to the receiving pair of lines. The connectors shown in Figs. 14-20 and 14-21 are commonly known as 8P8C connectors (or RJ-45).

Note that the 10Base-T specification given by the IEEE 802.3-1990 standard specifically distinguishes between wiring and connectors. Only one specific connector is allowed, while any twisted pair wiring scheme that meets the required simplex link characteristics is permitted.

In November of 1991 (after the IEEE 802.3-1990 standard had been released), EIA/TIA issued its Technical Systems Bulletin, TSB 36, Additional Cable Specifications for Unshielded Twisted Pair Cables. **(see Exhibit 5)** The introduction of this document states "As LAN speeds increase and users migrate to higher performance UTP cables, it is important for the industry to provide guidance on the categories of UTP cables available for data applications. This bulletin provides requirements on the transmission performance of these cables. The users of this bulletin should also consult with systems suppliers, equipment manufactures, and systems integrators to determine the suitability of the cables herein for specific applications." EIA/TIA-568 introduced 5 categories of wiring (CAT1, CAT2, CAT3, CAT4 and CAT5). CAT1 and CAT2 cables are not covered in the standard. These cables are typically used for voice or low speed data transmission. The characteristics of CAT 3 cables are specified at frequencies up to 16 MHz. EIA/TIA-568 states that "These cables are typically used for voice and data transmission up to 10 Mbps (e.g., IEEE 802.5 4 Mbps UTP annex and IEEE 802.3 10BASE-T)". CAT 4 and CAT5 cables were higher performance versions of CAT3 cables, able to handle data rates up to 16 Mbps and 100 Mbps, respectively. The standard further states that "The transmission characteristics presented herein apply to cables consisting of four unshielded twisted pairs of 24 AWG thermoplastic insulated conductors and enclosed in a thermoplastic jacket. These cables shall meet the physical and electrical requirements of ANSI/EIA/TIA 568-1991 standard for horizontal wiring and the supplementary requirements in this bulletin. Four-pair, 22 AWG cables which meet or exceed these requirements may also be used." The standard goes on to specify the mutual capacitance, the characteristic impedance (i.e., 100 Ω +/- 15% in the frequency range of 1 MHz up to the highest referenced frequency), the attenuation, and near end crosstalk.

One of ordinary skill in the art as of 1991 would have understood the term "10BASE-T wiring" to refer to wiring meeting the requirements set forth in the IEEE 802.3-1990 standard (section 14.4). Categories 3, 4 or 5 wiring, as specified in the ANSI/EIA/TIA 568-1991 standard, meet the definition of 10BASE-T wiring. CAT3, CAT4 and CAT5 wiring have 4 unshielded twisted pairs, but 10BASE-T wiring does not require that more than two of these pairs be used.

The Court construed the meaning of "10BASE-T wiring" in its *Markman* order of July 30, 2008 (Doc. 69) and the associated Memorandum of Claim Construction (Doc. 70,

filed 07/30/08) to be “Twisted pair wiring that meets the electrical and mechanical requirements of IEEE 802.3i standard, which includes Category 3 or better wiring.”
A somewhat more accurate construction would have been:

> “Twisted pair wiring that meets the electrical link specifications given in subsection 14.4 of the IEEE 802.3 Ethernet standard (i.e., IEEE 802.3i). These specifications are generally met by Categories 3, 4 and 5 wiring as described by the ANSI/EIA/TIA 568-1991 standard.”

The construction suggested above deviates from the prior *Markman* order principally by removing the phrase “and mechanical” and specifying the appropriate section (i.e., 14.4) of the standard. The removal of the phrase “and mechanical” is warranted since the 10Base-T specification given by the IEEE 802.3-1990 standard specifically distinguishes between wiring (section 14.4) and connectors (section 14.5).
Only one specific connector is allowed, while any twisted pair wiring scheme that meets the link characteristics is a permitted. My analysis is consistent with the declaration of expert witness Steven Carlson (for Foundry) who states on page 87 (see also pp. 78-88) of Doc. 147-2, dated 10/23/2009.

> “235. The IEEE 802.3i standard provides no normative mechanical requirements for wire or cabling.”

The patent history file indicates that the claims of the ‘260 Patent were twice amended before the patent was issued. Originally 18 claims were submitted. Two of these claims, 5 and 12, contained the phrase “10BASET” and in both claims the phrase “10BASET” was immediately followed by the word “wiring.” The phrase “10BASET wiring” remained in first amended claims 5 and 12, and a new claim 19 was added that terminated with the phrase "10BASET." Various of the claims were again rejected by the Patent Examiner. The Examiner also noted that "At the end of claim 19, it appears that after "10BASET" should be inserted –wiring—(note e.g. the end of claim 12)." Per the suggestion of the Patent Examiner, the word "wiring" was inserted after "10BASET" when claim 19 (which later became claim 17) was amended. None of the phrases "10BASET cables", "10BASET connectors", "10BASET wiring and connectors" nor "10BASET cables and connectors" appear in either the final patent or the patent file history.

Ethernet cables can be easily purchased with connectors or without connectors (i.e.,in bulk form or unterminated). (**see Exhibit 11**) Furthermore, most types of wiring can be used with more than one type of connector. The language in section 14.4.1 of the IEEE 802.3 2005 standard (**see Exhibit 4**, p. 340) reads "The medium for 10BASE-T is twisted-pair wiring. Since a significant number of 10BASE-T networks are expected too be installed utilizing in-place unshielded telephone wiring and typical telephony installation practices, the end-to-end path including different types of wiring, cable connectors, and cross connects must be considered." Thus the standard specifically distinguishes between the wiring and the connectors. Given all of the above facts, together with the lack of any additional intrinsic evidence to the contrary, the phrase "10BASET wiring" should have been construed to include only the wiring/cable and not the associated connectors.

As we will see, however, claims 14 and 17 of the '260 Patent are invalid whether the term "10 Base-T wiring" is construed to include the connectors or not, and thus the resolution of this issue needs no further consideration.

I.C.4. Comparison of 10BaseT and IBM Type 1 and Type 2 Wiring

Although the electrical characteristics of IBM Type 1 and Type 2 cabling is superior in many aspects (e.g., attenuation and crosstalk) to Category 3 (ANSI/EIA/TIA 568-1991 standard) wiring, the differential characteristic impedance of the IBM wiring is nominally 150 Ω, rather than the nominal 100 Ω specified by subsection 1.4.4.2.2 of the IEEE 802.3-1990 10Baset-T Ethernet standard (and as also specified by the ANSI/EIA/TIA 568-1991 standard). **(see Exhibit 4, section 14.4.2.2)** Since the Ethernet transceivers are impedance-matched to operate with 100 Ω wiring, the mismatch produced by the introduction of 150 Ω wiring would cause unwanted reflections, timing jitter and power loss along the links when used with Ethernet equipment. Thus, Type 1 and Type 2 cabling does not meet the specifications of IEEE 802.3-1990 10BASE-T Ethernet wiring**.**

The declaration of the Expert Witness (for Foundry), Carlson, (see items 244, 250, 251, 252, and the table on page 94 of Doc. 147-2, dated 10/23/2009).

asserts otherwise, namely, that IBM Type 1 and 2 cables satisfy the definition of 10BASE-T Ethernet wiring, since these cables together with the necessary impedance matching network may be use for 10BASE-T Ethernet equipment. This fact, however, is not sufficient to make IBM Type 1 and Type 2 cables equivalent to 10BASE-T Ethernet wiring. In an analogous fashion, a standard household 3-pronged electrical plug is not the same as a 2-pronged plug, in spite of the fact that it may be used in a 2-pronged electrical outlet provided a 3-pronged-to-2-pronged adapter is inserted between the 3-pronged plug and the outlet. Two-pronged and 3-pronged plugs are different, as are Ethernet 10BASE-T wiring and IBM Type 1 and Type 2 wiring.

Chrimar's Expert Witness, Albert McGilvra, rebuts the expert testimony of Steven Carlson, Foundry's expert. (Doc. 143-9, filed 12/04/09) Albert McGilvra, like me, also concludes that IBM Type 1 and Type 2 cabling is different from 10BASE-T Ethernet wiring. He gives a number of supporting reasons (not all of which I agree with), including the fact that the IBM cabling Type 1 and Type 2 and 10BASE-T Ethernet wiring have different impedances (see items 172 and 256 in Doc. 143-9).

I.D. Green Book and AMD Application Notes

The proposal of an interoperable solution (IOS), that was presented to the ANSI X3T9.5 Working Group, became known as the "Green Book": An Interoperable Solution for FDDI Signaling over Shielded Twisted Pair", Version 1.0, May 21, 1991. **(see Exhibit 8)** AMD subsequently published an Application Note written by Eugen Gershon: "FDDI on Copper with AMD PHY Components". The AMD Application Note showed circuit schematics and preliminary test results for the AMD implementation of the IOS. The basic idea behind these proposals was to replace the optoelectronic transceivers [7] in an FDDI concentrator with electrical transceivers and replace the optical fiber link between the M Port of a concentrator and the S port of a peripheral device with existing shielded copper wiring like IBM Types 1 and 2. Note that the proposal also allowed the M port (Ring Out) of one concentrator to be connected to the M port (Ring In) of an adjacent concentrator along the ring using the same electrical wiring. This is specifically stated on page 3 of the Green Book "2. Provide for concentrator to other concentrator or to station connection as shown in Figure 1.". The proposed IOS solution was incorporated into the

ANSI standard X3T9.5 in 1994 and became known as the Copper Data Distributed Interface (CDDI).

I.D.1. Green Book and Cable Detect Function

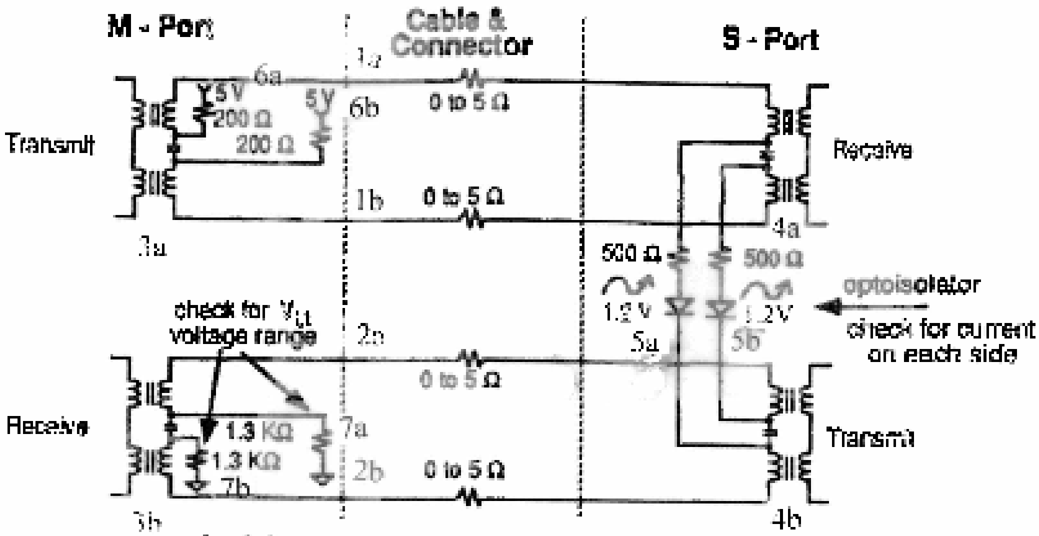
The proposed IOS in the Green Book and AMD Application Note also provided a link detect function that consisted of a signal detect function and a cable detect function. The signal detect function determined whether the data signal was of sufficient strength to allow acceptable communication performance. The cable detect function, on the other hand, determined whether the cable of copper wires was (properly) connected to both the concentrator and the SAS peripheral device (or another concentrator). The cable included at least two pairs of twisted copper wires, one pair for transmit and a second pair for receive that connected the concentrator to a SAS peripheral device (or another concentrator). The Green Book and the AMD Application Note gave examples of the cable detect implementation. One of these examples (example 2, Fig. A-2 in the Green Book, **see Exhibit 8**), appearing as a annotated figure on page 28, shows a pair of center-tapped isolation transformers (3a and 3b) inside the concentrator connected to the concentrator's transmit M-port and receive M-port, respectively. A similar pair of center-tapped isolation transformers (4a and 4b) inside the peripheral equipment are attached to the receive S-Port and the transmit S-port of the peripheral device, respectively. The transmit and receive twisted wire pairs ((1a, 1b) and (2a,2b)) connects the M- and S-ports together. The center-taps of the two transformers at the S-port of the peripheral device are also connected together through a series combination of a 250 Ω resistor and a photodiode (5). At the transmit M-port of the concentrator, a 5 V DC source (6) in series with a 100 Ω resistor is connected to the center-tap of the transformer (3a). This voltage source causes a DC current to flow from (i) the transmit M-port of the concentrator along each of the two transmit wires (1a and 1b) to the peripheral device, (ii) then through the series combination of a 250 Ω resistor and photodiode (5) to the center-tap of the transformer at the transmit S-Port in the peripheral device, (iii) then along each of the two data communication wires (2a and 2b) from the transmit S-Port of the peripheral device back to the receive M-Port of the concentrator, and (iv) finally the current flows from this center-tap of the transformer (3b) at the receive M-Port of the concentrator to ground through a 650 Ω resistor (7), thus completing the circuit and producing a voltage drop across the 650 Ω resistor. This voltage drop, will be approximately given by

$$V_{650} = (5-1.2) \times \frac{650}{(100+250)+650} \approx 2.5 \text{ volts}.$$

If (i) there is not a cable (consisting of two or more pairs of data communication lines) connecting the M port of the concentrator to the S port of the peripheral device or (ii) if this cable is defective (e.g., contains a broken wire(s)) or (iii) if this cable is incorrectly connected then no current will flow through the 650 Ω resistor (7), and the voltage drop across the 650 Ω resistor will be zero volts. If two adjacent concentrators are to be connected together, and if the cable between the concentrators is absent, incorrectly connected or defective, then the concentrator must wrap or seal the ring to maintain

APPENDIX 1: CABLE DETECT IMPLEMENTATION EXAMPLES

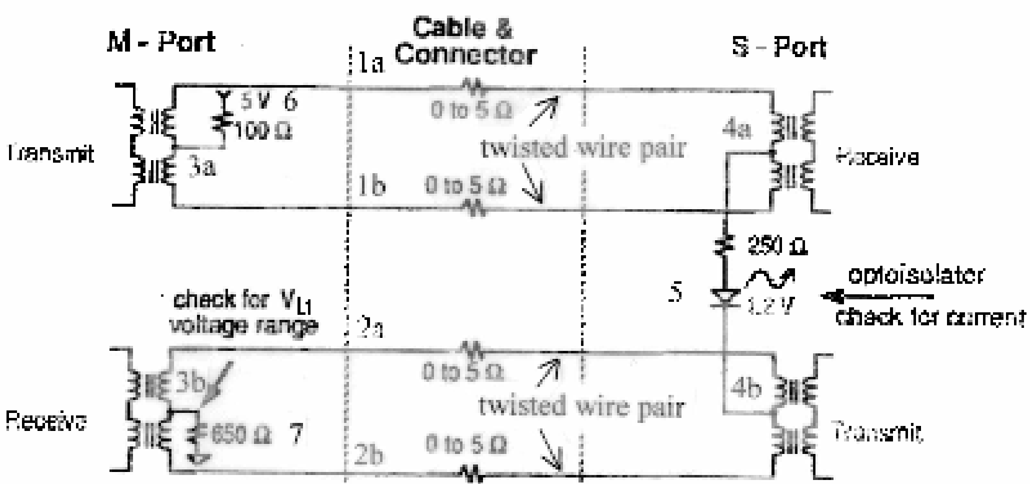
Figure A-1 shows a cable detect implementation example where a 2 mA nominal phantom current is sourced at each Transmit pin of the M-Port (4 mA total). V_{l1} is nominally 2.5 V with a properly connected link, 4.3 V with the loopback case, and 0 V with broken wires.



Cable Detect Implementation Example 1

concentrator Figure A-1 peripheral device

Figure A-2 shows an alternate cable detect implementation example where a 4 mA nominal phantom current is sourced at Transmit pins of the M Port. V_{l1} is nominally at the same values as in example 1. The circuits of example 1 and 2 interoperate with each other.



M-Port S-Port

Cable Detect Implementation Example 2

Figure A-2

concentrator 12 peripheral device

operation as discussed above. The cable interface connector on some concentrators will wrap (i.e., connect the transmit wires of the concentrator's transmit M-Port directly to the receive wires of the concentrator's receive M-port) if the cable is removed. The cable detect circuitry, disclosed in the Green Book, can detect this situation, because if the pair of transmit wires at the M-Port are connected directly to the pair of receive wires at the M-port, then the voltage drop across the 650 Ω resistor will become

$V_{650} = 5 \times \frac{650}{100 + 650} \approx 4.3\,\text{volts}$. Thus the 650 Ω resistor shown in the Green Book is a "detector means". It will have a 2.5 volt drop across it when the cable is not defective (i.e., no broken wires) and is properly connected. If the concentrator does not have a wrap connector, then the 650 Ω resistor will have a 0 volt drop across it when the cable is either defective (e.g., broken wire(s)) or not connected. Finally, if the concentrator does have a wrap connector, then the 650 Ω resistor will have a 0 volt drop across it if the cable is defective and connected to the concentrator and a 4.3 volt drop across it if the cable is not connected to the concentrator. If the cable is not defective, and if it is properly connected, then the removal of the cable from the peripheral device will cause the voltage drop across the 650 Ω resistor to change from 2.5 volts to 0 volts. If the cable is not defective, and if it is properly connected, then the removal of the cable from the concentrator will cause the voltage drop across the 650 Ω resistor to change from 2.5 volts to either 0 volts (when there is no wrap connector on the concentrator) to 4.3 volts (when there is a wrap connector on the concentrator). In all cases, disconnection of the peripheral device from the network either by unplugging the cable at the peripheral device end or the concentrator end will result in a voltage change across the 650 Ω resistor and hence can be detected.

I.D.2. Differential versus Phantom Current Loops

The interpretation of the term "current loop(s)" in the instant and Cisco case has also been a point of considerable disagreement between Chrimar and Foundry. The data communication lines connected to the peripheral equipment will generally consist of twisted pairs of copper wiring. One of these pairs will serve to carry data transmitted from the network to the peripheral device (hereafter called a pair of transmit wires), and a second pair will serve to carry data transmitted by the peripheral device to the network (hereafter called a pair of receive wires). In the preferred embodiment (see '260 Patent col. 3 31:52), there is only a single current loop passing through the peripheral device and it is comprised of a single pair of receive wires or a single pair of transmit wires, but not a pair consisting of one transmit and one receive wire. Such a current loop is known as a differential loop.

The FDDI Publications (see **Exhibit 8**) illustrate multiple current loops, each consisting of a single transmit wire and a single receive wire, connecting the concentrator to the peripheral device.

In Cisco, the *Markman* order interpreted "current loop means" to be "Multiple current loops with each loop associated with a corresponding piece of electrical equipment. Each of the current loops is a pair of data communication lines that connect the corresponding piece of electronic equipment to a network through existing internal circuitry." In the instant case, the term "current loop" is interpreted to mean "A round-trip path through a selected pair of data communication lines and an associated piece of equipment" (Chrimar v. Foundry *Markman* order, Doc. 69, filed 7/10/08).

Term	Cisco	Chrimar v. Foundry
current loop	Multiple current loops with each loop associated with a corresponding piece of electrical equipment. Each of the current loops is a pair of data communication lines that connect the corresponding piece of electronic equipment to a network through existing internal circuitry.	A round-trip path through a selected pair of data communication lines and an associated piece of equipment

Both of these constructions, as written, permit (1) one or more current loops per piece of peripheral equipment and (2) current loops consisting of either a pair of transmit wires or a pair of receive wires or a pair of wires consisting of one transmit and one receive wire. Furthermore, in view of the fact that claim 1 was ruled invalid by the prior art disclosed in the FDDI Publications, the Cisco Court construed that each peripheral piece of equipment can have one or more current loops and that each current loop can consist of a pair of transmit wires or a pair of receive wires or one transmit wire together with one receive wire. If the Court had construed otherwise, it could not have reached a conclusion of invalidity of claim 1 based on the FDDI Publications as prior art. Thus Chrimar is collaterally estopped of arguing otherwise in the instant case.

It appears that the accused Foundry devices (i.e., PoE switches) in the instant case all have multiple current loops per piece of peripheral equipment and each loop includes both transmit and receive wires. Thus both Chrimar and Foundry have a significant stake in the interpretation of this term "current loop," since the interpretation could play a pivotal role in deciding infringement in the instant case. Chrimar and Foundry have offered opposing opinions in their infringement briefs as to the number and type of current loops, and each takes exactly the opposite position when arguing the issue of invalidity (see, for example page 4, Doc. 205, filed 12/22/10) rather than infringement. **(see Exhibit 9)** As a related matter, Chirmar also raised this issue when it asked the Court for reconsideration or clarification of its *Markman* ruling (Doc. 76, filed 10/02/08). Chrimar seeked a ruling from the Court that

> "Nothing in either …the Markman Order…or Memorandum on Claim Construction shall be interpreted to restrict:
>
> a. the number of wires over which a current loop can be formed
>
> b. the term "a pair" to specific wires based on transmit/receive nomenclature

Clearly Chrimar is concerned that the ***Markman*** ruling will limit the scope of the '260 Patent. The Court stayed Chrimar's motion for reconsideration/clarification and stated

> "…the Court is satisfied that decision on the motion at the present stage is premature. It appears that the Court is being asked to make a ruling which may materially impact the issue of infringement in circumstances where it knows nothing of the accused devices. Accordingly, decision on the motion is STAYED until such time as the nature of the accused devices are fully explicated on the record either as part of summary judgment or after the Joint Pretrial Statement antecedent to trial is filed" (Doc. 76, filed 10/02/08).

With a differential current loop, the received data signal at either the concentrator or the peripheral equipment is detected after passing through the isolation transformer by measuring the voltage difference (i.e., a differential measurement) across the secondary windings of the transformer. It is a basic fact of physics, that non-time varying signals will not pass through the a transformer from the primary windings to the secondary windings. Thus if the voltage source used for the cable detect function remains perfectly constant, it will not interfere with the data signal. If, however, the voltage source varies even slightly it will produce a signal at the secondary windings of the isolation transformer that may interfere with the data signal. Therefore a “low” current should be used in the differential current loop to avoid interference.

Example 2 Figure A-2 in the Green Book (**see Exhibit 8**) shows four current loops

$$3a \to 1a \to 4a \to 4b \to 2a \to 3b$$
$$3a \to 1a \to 4a \to 4b \to 2b \to 3b$$
$$3a \to 1b \to 4a \to 4b \to 2a \to 3b$$
$$3a \to 1b \to 4a \to 4b \to 2b \to 3b$$

that contain a common segment, i.e., $4a \to 4b$. Each of these current loops originates from the DC source (6) that is connected to the transformer (3a) center-tap (at the transmit M-port of the concentrator) and terminates at the 650 Ω resistor that is connected to the center-tap of the transformer (3b) at the receive M-port of the concentrator. The voltage drop across the 650 Ω resistor will be 2.5 volts provided at least one of the two transmit wires and at least one of the two receive wires are properly connected and are unbroken between the concentrator and the peripheral device. A break in a single transmit and/or a single receive wire will not change the voltage across the 650 Ω resistor, and thus will remain undetected. Removal of the cable, however, will be detected since it will cause the voltage drop across the 650 Ω resistor to become 0 (for simplicity of exposition we consider no wrap back connector here). Example 1 in Figure A-1 in the Green Book shows two separate current loops

$$6a \to 1a \to 4a \to 5a \to 4b \to 2a \to 7a$$
$$6a \to 1b \to 4a \to 5a \to 4b \to 2b \to 7b$$

Each of the four center-tap transformers shown in Example 2 has been replaced by a pair of transformers. Both of the current loops originate from separate 5 volt DC sources (6a and 6b) that are connected to a transformer at the transmit M-port of the concentrator and terminate at a 1300 Ω resistor (7a and 7b) that is connected to a transformer (3b) at the receive M-port of the concentrator. Note that these two loops are electrically isolated from one another by the four capacitors placed between the transformer pairs. The voltage drop across each of the 1300 Ω resistors will be approximately 3.3 volts when the cable is properly connected and all of the transmit and receive wires are unbroken. If any transmit or receive wire is broken, then the voltage across the corresponding 1300 Ω current loop resistor will be 0 volts. Thus the implementation shown in Example 1, Fig. A-1 allows the integrity of the cable to be checked (i.e. to determine whether it is properly connected and whether any of the 4 data communication lines are broken). Removal of the cable will result in the voltage drop across the 650 Ω resistor becoming 0 volts, and thus will also be detected (for simplicity of exposition we consider no wrap back connector).

The implementations shown in Example 2, Fig. A-2 of the Green Book (**see Exhibit 8**) use both the transmit pair of wires and the receive pair of wires, unlike the preferred embodiment of ‘260 Patent, which uses only a single pair, either the transmit or the receive. Because of the use of center-tap transformers shown in Example 2, Fig. A.2, the current flow is along the same direction in the two transmit (receive) wires, and hence induces no differential voltage drop across the primary of the center-taped isolation transformers (4a and 3b). Hence, even if the voltage source used for cable detection is time-varying it will not produce any change in the data signal (differentially detected) at the secondary of the center-taped isolation transformers (4a and 4b). Thus much higher cable detect DC loop voltages can be used with this implementation than are possible with the preferred embodiment described in the '260 Patent, while still avoiding interference with the data. The current loop shown in Example 2, Fig. A-2 of the Green Book is often referred to as a "phantom current loop" since the loop detect current is not "visible" at the secondary of the isolation transformers (4a and 4b) when a differential voltage measurement is used to determine the data signal.

The Green Book provides guidelines for obtaining an interoperable solution (IOS) for using copper wiring together with FDDI. The Green Book is not a standard, and thus does not mandate any particular implementation for achieving IOS for copper wiring with FDDI. It simply proposes a particular IOS. As such, it also gives guidelines for the wire/cable and connectors to be used. Furthermore Figure A-2, by itself, (Example 12 in the Green Book) (**see Exhibit 8**) discloses all of the limitations (i.e., current loop means, source means, and detector means) of the '260 Patent, as will be discussed in section II of this report.

I.D.3. Green Book Wiring

The Green Book guidelines suggest the "Use of installed 150 Ω cable plant, including wiring currently used for IEEE 802.5 Token Ring networks, i.e., Types 1 and 2. Type 6 may be used for short patch cables." The wiring should also "Meet the topology and distance requirements of the building wiring standard, EIA 568." Note the Green Book does not say that the wiring should meet the complete EIA 568 standard, but simply the topology and distance requirements of EIA 568. Note that EIA 568 specifies unshielded twisted wire pairs. The Green Book provides further guidelines on wiring/cables and connectors in section 7. Namely Table 3, repeated below, provides the electrical cable characteristics suggested by the Green Book. The Green Book further states these electrical characteristics are typically met by 100 m lengths of IBM Type 1 and Type 2 cables.

Characteristics	Value
Differential Impedance	150 Ω +/- 10%
Attenuation at 62.5 MHz	12 dB max
Near End Crosstalk	-42 dB max

Cable Characteristics
Table 3
(From the Green Book, **see Exhibit 8**)

The electrical characteristics of the cabling depends on the wire material and insulation as well as the wire/cable the geometry (i.e., the size of the wires/insulation, the spacing between wires, wire twisting, etc.). Binary digital data transmitted over a wire pair generally consists of sending a sequence of voltage pulses down the pair of wires. The wires act as waveguides along which the pulses propagate from the transmitter to the receiver. As these pulses propagate they will become attenuated and distorted in shape. These effects become more severe as the length of the cable increases. The pulses may also be reflected at the interface between the cable ends and the attached equipment preventing effective power transfer and causing interference. These reflections can be avoided by matching the impedance of the equipment to the differential impedance of the cable. Type 1 and Type 2 cables have differential impedances of ~ 150 ohms, while Ethernet 10BASE-T wiring has a differential impedance of ~ 100 ohms. The signals in pairs of wires that lie in close proximity may also couple to one another causing unwanted crosstalk between different signals. The wires may also pick up interference from other electrical and electronic devices in the building. This interference can be minimized by using twisted wire pairs, and by shielding when necessary. In order to connect the M-port of a concentrator to the S-port of peripheral equipment, the cable must contain at least two pairs of wires, one pair for transmit and one pair for receive.

The Green Book in section 7.2 (**see Exhibit 8**) also suggests a pair of connectors to be used with shielded twisted wire pairs. These are shielded 9 pin D connectors as shown in Figure 9 of the Green Book. These are identical male connectors. Pins 1 and 6 of the M-port connector are attached to the transmit pair of wires, while pins 5 and 9 are attached to the receive pair of wires. These pin connections are reversed for the S-port connector.

I.E. Network Layers

It is common practice when discussing computer networks to describe the protocols that are implemented in terms of layers. Back in the 1970s, the International Organization for Standardization (ISO) introduced the following 7 layer model, called the Open Systems Interconnection (OSI) model.

Application
Presentation
Session
Transport
Network
Link
Physical

OSI Reference Model

Each layer in the OSI model provides its service by performing tasks within the layer and using the functions of the layer immediately below it. The ‘260 Patent only relates to the physical layer of the network. The purpose of the physical layer is to move individual bits from one node (e.g., a concentrator) of the network to another (e.g., a peripheral device). The operation of this layer depends on the transmission media, for example, coaxial cable, twisted pair wiring, fiber optics, etc. The physical layer may add error control coding to overcome bit transmission errors, line coding (such as NRZI or Manchester line coding) for clock synchronization, equalization to compensate for the spectral response of the transmit/receive wiring, amplifiers to boost the signal strength, circuits to detect whether the transmit/receive medium is busy, link detect functions to determine cable connectivity, etc. The link layer, on the other hand, is responsible for the network protocols (such as the frame format and media access control (MAC)) associated with moving packets of bits between network nodes, while the physical layer controls the transmission/reception of each individual bit within these packets. The Ethernet standard IEEE 802.3, the token ring standard IEEE 802.5, the FDDI standard ANSI X3T-9.5, and the CDDI standard ANSI X3T-9.5 specify only the physical and link layer of the network. Ethernet is the dominate networking technology deployed today.

Exhibit 4 (IEEE 802.3 2005 Ethernet standard, Fig. 14-1, p. 315) illustrates the relationship between the 10Base-T Ethernet standard and the Open Systems Interconnection (OSI) network layering model discussed above.

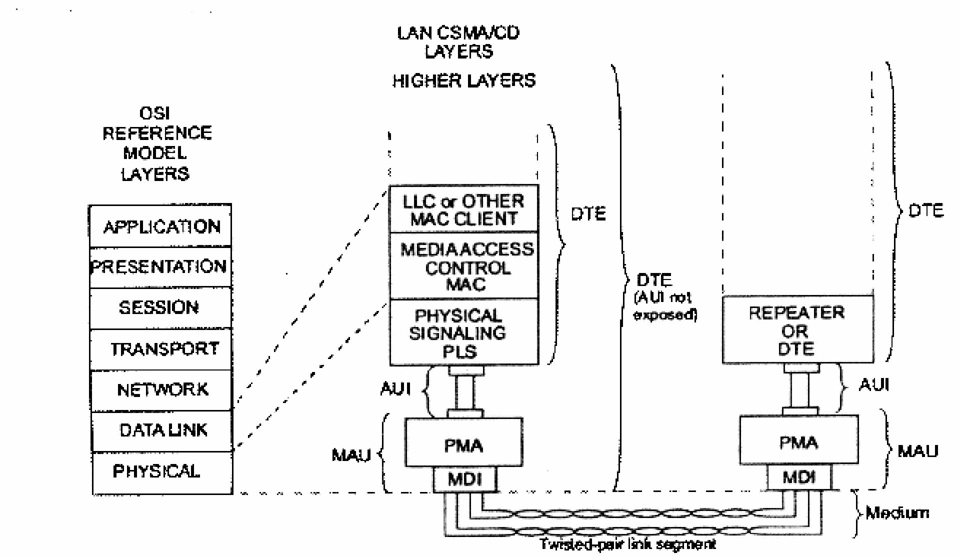


Figure 14–1—10BASE-T relationship to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 CSMA/CD LAN model

As mentioned above, the '260 Patent only relates to the physical layer. As seen in Fig. 14-1 of the IEEE 802.3 2005 Ethernet standard, the physical layer consists of several sublayers: (1) physical signaling (PLS), (2) the attachment unit interface (AUI), (3) the physical medium attachment (PMA), and (4) the media dependent interface (MDI). The PLS together with the MAC is often implemented on a single electronic circuit card, known as the network interface card (NIC), that can be installed in concentrators and peripheral equipment. The PLS implements medium (i.e., transmit/receive wiring) independent coding, for example, Manchester coding for clock synchronization. The attachment unit interface (AUI) connects the PLS to the medium attachment unit (MAU), which is comprised of the PMA and MDI. The MAU enables the PLS sublayer, by way of the AUI, to be attached to the transmit/receive twisted wire pairs. It also performs the link status function, including transmit/receive cable status, i.e., cable connected or disconnected. It is the last of these functions that is the subject of the ‘260 Patent.

10Base-T Ethernet transmits the data bits at baseband frequencies using Manchester coding for clock synchronization. In order for 10Base-T Ethernet to support its 10 Mbps data transmission rate, the medium must meet the required specifications of section 14.4 of the IEEE 802.3 2005 over a bandwidth extending to approximately 10 MHz. CDDI, on the other hand, uses a different line encoding technique (i.e., 4B/5B and NRZI) to facilitate clock synchronization. For a data rate of 100 Mbps, CDDI requires a transmission bandwidth of approximately 62 MHz.

I.F. Chrimar v. Cisco Ruling (318 F. Supp. 2d 476)

The instant case before the Court is closely related to the prior litigation of invalidity and infringement of claim 1 of the ‘260 Patent, Chrimar v. Cisco (318 F. Supp. 2d 476), that was also heard by this Court.

Claim 1, which is a means-plus-function-claim, reads

> 1. A security system for detecting the disconnection of electronic equipment from a network, said security system comprising:
>
> > Current loop means including separate current loops associated with
> >
> > > different

pieces of monitored equipment, each of said current loops employing a pair of data communication lines which connect one of the associated pieces of equipment to the network and which are coupled to existing internal circuitry within the associated piece of monitored equipment, wherein respective pairs of data communication lines are associated with different ones of the associated pieces of equipment;

source means for supplying a low DC current signal to each of said current loops; and

detector means for monitoring the current signal through each of said current loops and detecting a change in said current signal through one of said current loops which represent disconnection of said associated piece of equipment from the net- work.

In Cisco, the Court held a *Markman* hearing on May 16, 2002. The Memorandum (Doc. 70, filed 07/30/08) and Order (Doc. 69, filed 07/110/08) on Claim Construction associated with this decision case interpreted the following 6 claim terms

(1) a security system

(2) current loop means

(3) existing internal circuitry

(4) source means

(5) low DC current signal

(6) detector means.

Only one of these claim terms (i.e., "current loop") was also interpreted in the *Markman* hearing associated with the instant case.

In item (5) of the above list, the term "low" was interpreted, but the term "DC" was not interpreted by the Cisco Court. The Court's interpretation of "DC" in Chrimar v. Foundry could have a significant impact on whether or not the accused Foundry devices infringe on claim 14 and/or claim 17 of the '260 Patent. In the instant case, the term "DC" has been interpreted by the Court (*Markman* Order, Doc. 69, filed 7/10/08), though the interpretation adopted by the Court is inconsistent with both the general meaning of DC in the field of electronics and the intrinsic evidence in the '260 Patent.

Cisco moved for summary judgment on the issues of invalidity and noninfringement subsequent to the *Markman* decision in Cisco. A Special Master, Paul M. Janicke, was appointed to handle these motions and make a report and recommendation to the Cisco Court. His recommendations were adopted by the Cisco Court. In its final judgment, the Cisco Court decided that claim 1 was invalid by anticipation, citing two pieces of prior art – the printed publications the "Green Book" and the "AMD Application Note" (collectively known as the "FDDI Publications"). Both references were found by the Court to contain enabling disclosures of every limitation in claim 1 (i.e., current loop means, source means, detector means).

I.G. Collateral Estoppel Based on Cisco

In the instant case, the Special Master, Professor Lemley recommended that collateral estoppel (based on Cisco) bind Chrimar to fact issues decided regarding the FDDI

Publications prior art and invalidity of claim 1 of the ‘260 Patent (Doc. 127, filed 04/23/10). Along with his report, Professor Lemley listed 38 specific findings from the Cisco judgment to which, he would recommend that collateral estoppel be applied (Doc. 127, Appendix A). The Court adopted these recommendations regarding the application of collateral estoppel (Doc. 139) on August 8, 2010. The findings of fact that Chrimar is estopped from relitigating include (but are not limited to):

> Finding 29: The “cable detect” circuit checks the V L1 voltage signal to determine if a computer is disconnected it is 2.5 V when connected and 0 V when disconnected. Chrimar’s own demonstration to the Court at the hearing on Chrimar’s objections to the Special Master’s R&R confirmed that the Green Book works for this purpose because an alarm sounded when the computer was disconnected.
>
> Finding 30: The fact that later circuitry can also detect the operation of a wrap-back connector (through a 4.3 V signal) does not mean the 650 ohm resistor is not a “detector means”. The 650 ohm resistor is still capable of providing an indication of a change in current flow from 2.5 V to 0 V, which represents a disconnection of a computer. When wrap-back connectors are not used, there are only two possible V L1 voltage levels. In that case, the 650 ohm resistor would operated exactly the same as the resistor R2 if the alarm circuitry of the ‘260 patent preferred embodiment were added downstream.
>
> Finding 31: Green Book does not say that the use of wrap-back connectors is essential; it merely says it is “likely” that a cable with wrap-back connectors will be used. Chrimar produced no testimony from anyone knowledgeable with the

> creation of the Green Book who claimed the sole embodiment of the Green Book used wrap-back connectors.

Thus Chrimar is estopped from arguing that the FDDI Publications do not disclose a cable disconnect function and only discloses the detection of broken cable wires and/or a wrap-back condition.

II. Invalidity of Claim 14 '260 Patent

Method claim 14 of the '260 Patent reads as follows:

> 14. A method for detecting unauthorized disconnection of remotely located electronic equipment which has existing data communication lines connecting the equipment to a network, said method comprising:
>
> selecting respective pairs of the existing data communication lines for associated pieces of monitored equipment so that each of said selected pairs of data communication lines forms a current loop through the associated pieces of monitored equipment, wherein said respective pairs of communication lines are associated with different ones of the associated pieces of equipment;
>
> supplying a low DC current signal to each current loop so as to achieve continuous current flow through each current loop while each of said associated pieces of equipment is physically connected to said network via the data communication lines; and
>
> sensing said DC current signal in each of said current loops so as to detect

a change in current flow indicative of disconnection of one of said pieces of associated equipment.

Foundry, filed a motion for summary judgment of the invalidity of claims 14 and 17 of the '260 Patent on 9/17/10 (Doc. 143). Foundry's primary argument in support of its motion is that claims 14 and 17 are invalid over two prior art publications – the "Green Book" and "AMD Applications Note" (collectively, the "FDDI Publications").

The Court held in *Chrimar v. Cisco* that claim 1 of the '260 Patent is invalid by anticipation by the FDDI Publications. [*Chrimar Syst, Inc. v. Cisco Sys, Inc.*, 318 F. Supp 2d 476, 492 (E.D. Mich. 2004)] Thus every limitation of claim 1 appears in the FDDI Publications. On August 30, 2010, the Court adopted the Special Master's recommendation, holding that Chrimar is collaterally estopped from relitigating the Court's factual findings in *Cisco* that both the Green Book and the AMD Application Note (and related public uses of the technology described herein) anticipate claim 1. [Doc. 139] Thus in order to establish the invalidity of claim 14, one needs only to demonstrate that the limitations of claim 14, not also appearing in claim 1, are anticipated by the FDDI Publications.

In its response to Foundry's motion for summary judgment of invalidity of claims 14 and 17, Chrimar asserts that "The terms that Foundry asked to be construed here (which render claim 17 different from claim 1) except these newly constructed terms from the application collateral estoppel." [Doc. # 194 at 4] Chrimar argues, for example, that the Green Book mandates IDC connectors [Doc. # 194 at 6], that Foundry equates disconnection with broken wires [Doc. # 194 at 7], that the current loops shown in Fig. A-2 (example 2) of the Green Book do not consist of a pair of communication lines [Doc. #

194 at 6] as required by the '260 Patent, etc. Previously, Chrimar raised five objections to the Special Master's recommendation that collateral estoppel be applied to the instant case. Although Foundry's motion for collateral estoppel was granted, Chrimar, either directly or indirectly, continues to raise two of the five objections it raised earlier, namely (2) collateral estoppel is inappropriate because claim 17 differs from claim 1 and (4) that the Court misunderstood the teachings of the prior art. [Doc. # 139 at 4].

On this issue, the Court has written "Chrimar essentially objects that the application of collateral estoppel will result in inconsistent results because claim 17 differs from claim 1." [Doc. 139 at 5] The Special Master, Professor Lemley addressed this issue when he said: "The only scintilla of doubt relates to whether the issues in dispute in Cisco were in fact the same issues that are in dispute today. In particular, the determination that a limitation disclosed by a prior art reference is not automatically a determination that the same-worded limitation in another claim is disclosed by the same reference." [Doc. 139 at 5]. "The Court agrees with the Special Master's assessment that there are issues which are common to both the Cisco litigation and this action, particularly with respect to the teaching of the prior art." [Doc. 139 at 6].

Chrimar's arguments are repetitive but unavailing. Each and every issue raised and decided in Cisco regarding the meaning/interpretation of the prior art are common to the instant case, and thus these interpretations are equally applicable to and valid for claims 14 and 17.

Below a side-by-side comparison of claims 1 and 14 are presented, and the relevant language differences between the claims are highlighted.

Claim 14	Claim 1
14. A method for detecting unauthorized disconnection of remotely located electronic equipment which has existing data communication lines connecting the equipment to a network, said method comprising:	1. A security system for detecting the disconnection of electronic equipment from a network, said security system comprising:
selecting respective pairs of the existing data communication lines for associated pieces of monitored equipment so that each of said selected pairs of data communication lines forms a current loop **through** the associated pieces of monitored equipment, wherein said respective pairs of data communications lines are associated with different ones of the associated pieces of equipment;	current loop means including separate current loops associated with different pieces of monitored equipment, each of said current loops employing **a** pair of data communication lines which connect one of the associated pieces of equipment to the network and which are coupled to existing internal circuitry within the associated piece of monitored equipment, and wherein respective pairs of data communication lines are associated with different ones of the associated pieces of equipment;
supplying a low DC current signal to each current loop so as to achieve **continuous current flow** through each current loop while each of said associated pieces of equipment is physically connected to said network via the data communication lines; and	source means for supplying a low DC current signal to each of said current loops; and
Sensing said DC current signal in each of said current loops so as to detect a change in current flow indicative of disconnection of one of said pieces of associated equipment.	detector means for monitoring the current signal through each of said current loops and detecting a change in said current signal through one of said current loops which represent disconnection of said associated piece of equipment from the net-work.

The relevant language of claim 14, that is not also present in claim 1, is (i) "unauthorized disconnection," (ii) "selecting respective pairs," (iii) "forms a current loop through the associated pieces of monitored equipment," (iv) "so as to achieve continuous current flow through each current loop while each of said associated pieces of equipment is physically connected to," and (v) "sensing said DC current signal in each of said current loops."

In the Cisco case, a Markman order interpreted the following six terms of claim 1: (1) a security system, (2) current loop means, (3) existing internal circuitry, (4) source means, (5) low DC current signal, and (6) detector means

a security system	Not a limitation
current loop means	Multiple current loops with each loop associated with a corresponding piece of electrical equipment. Each of the current loops is a pair of data communication lines that connect the corresponding piece of electronic equipment to a network through existing internal circuitry.
existing internal circuitry	Electronic circuitry is circuitry present in the monitored piece of electronic equipment at the time the end user acquires it.
source means	A DC power source is a source that is capable of generating low DC current in multiple current loops.
low DC current signal	A DC current that is sufficiently low so that it does not interfere with or adversely affect the operation of the associated electronic equipment or computer network.
detector means	One or more electronic components capable of providing an indication of a change in the current flow which represents disconnection of a piece of electronic equipment from the network. The indication need not be human-perceptible.

Chrimar Systems, Inc. v Cisco Systems, Inc. 318 F. Supp. 2d 476 (2004)

For the instant case, the following thirteen claim terms were interpreted by a Markman order:

(1) detecting unauthorized disconnection, (2) data communication lines, (3) selecting respective pairs, (4) current loop, (5) supplying, (6) low, (7) DC current signal, (8)

physically connected, (9) sensing, (10) said DC current signal in each of said current loops, (11) a change in current flow, (12) selectively tapping…, and (13) 10Base T wiring as:

detecting unauthorized disconnect	Does not need to be construed because the preamble is not limiting.
data communication lines	Communication lines typically used for carrying data.
selecting respective pairs	Choosing a pair of data communication lines for each associated piece of monitored equipment that is different than any of the other pairs associated with other pieces of equipment.
current loop	A round-trip path through a selected pair of data communication lines and an associated piece of equipment.
supplying	Causing a DC surrent to flow.
low	A DC current that is sufficiently low that it does not interfere with or adversely affect the operation of the electronic equipment.
DC current signal	A flow of current in only one direction.
physically connected	This term needs no construction.
sensing	Automatic detection.
said DC signal in each of said current loops	A low DC current signal that has achieved continuous current flow through associated current loop.
a change in current flow	A discontinuity in the flow of said DC current signal through an associated current loop that is indicative of a physical disconnect.
selectively tapping…	Creating electrical conductivity to each selected pair of each piece of associated equipment.
10BaseT wiring	Twisted pair wiring that meets the electrical and mechanical requirements of the IEEE 802.3i standard, which includes Category 3 or better wiring.

[Doc. # 69 and Doc. # 70]

The Markman order associated with the Cisco ruling found that the phrase “security system” in claim 1 was not limiting. [*Chrimar Systems, Inc. v Cisco Systems, Inc*. 318 F.

Supp. 2d 476 (2004)] Similarly in the *Markman* order associated with the instant case [Doc #69 at 1], the preamble to claim 14, including the phrase "detecting unauthorized disconnect" was also found to be nonlimiting for a number of reasons, including (i) the fact that it does not limit the scope of the claim but merely "state a purpose or intended use of the invention" [*Rowe*, 112 F.3d at 478] and (ii) in the absence of the preamble, claim 14 stands on its own as a structurally complete description of the invention [4] [*Catalina Marketing Int'l, Inc. v. Coolsavings. Com, Inc.*, 289 F.3d 801, 808 Fed. Cir. (2002); *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)]. Thus both claims 14 and 1 talk about a "disconnection" without limiting the type (i.e., theft, unauthorized, etc.) of disconnection. I am unaware of any specific discussion by the Court on whether or not the phrase "remotely located" in the preamble of claim 14 is limiting. One could make an argument that *remote* detection via the data communication lines, independent of its purpose, is a central element of the invention. It is indisputable, however, that the FDDI Publications disclose a remote detection method for determining disconnection, and thus whether or not the preamble phrase "remotely located" is limiting has no bearing on whether or not the FDDI Publications anticipate claim 14.

By Court order, Chrimar is collaterally estopped from relitigating the fact findings in Cisco regarding the "Green Book" and the "AMD Application Note" prior art, and the invalidity of claim 1 of the '260 Patent based on this prior art. [Doc. # 139] Chrimar is also collaterally estopped from relitigating the 38 findings of fact appearing in the Court's order granting collateral estoppel. These 38 findings of fact include, but are not limited to: [Doc. # 139], [Doc. # 127]

Finding 18: Green Book discloses multiple current loops with the meaning of claim 1, each loop including pairs of copper data communication lines contained in the cable that connect individual computers to the FDDI network via concentrators. *Id.* at 496-499.

Finding 20: The only changes needed to implement the Green Book in a working FDDI-over STP network were the use of STP cables instead of optical fiber and the replacement of the optical transceiver (PMD) in the FDDI NIC with an electrical transceiver (PMD). Green Book fully discloses all of the necessary elements to make a "network" within the meaning of claim 1. *Id.* _ _ _ _

Finding 22: Green Book discloses the use of "respective pairs of data communication lines [that] are associated with different ones of the associated pieces of equipment" within the meaning of claim 1. Green Book's FDDI-over STP implementation is a physical star configuration with logical flow. *Id.* at 498-99.

Finding 24: In the "cable detect" circuit, the upper and lower pairs of wires extend from the M-port of the concentrator to the Sport of one particular piece of equipment. Further, the data flows directly between the equipment and the concentrator in a FDDIover-STP network just as it does between the equipment and the hub in the '260 patent; hence there is at least a one-to-one correspondence between the data communication lines connecting the concentrator and the equipment from the logical perspective as well. *Id.*

Finding 25: The Green Book contains an enabling disclosure of "current loop means" because it discloses a current loop over a pair of data communication lines that connect a piece of electronic equipment to a network through existing internal circuitry. Enablement of the associated network is not required. The Green Book discloses pairs of data communication lines (STP cable) physically connected to one particular piece of equipments. *Id.* at 499

Finding 26: The Green Book uses a 5 volt DC power supply to inject a low DC current onto the data communication lines, which power supply corresponds to input terminal 25 and isolation power supply 26 in the '260 patent. Hence, there is a source means. *Id.*

Finding 27: The 650 ohm resistor in the Green Book is a "detector means" because it is in the same circuit position as resistor R2 in the '260 patent and different voltages applied across it depending on whether current is flowing in the loop. Here, the 650 ohm resistor is capable of providing an indication of a change of current flow from 2.5 V to 0 V, which represents disconnection of a computer. That is all that is necessary to meet the "detector means" limitation of claim 1. *Id.* at 501, 502

Finding 29: The "cable detect" circuit checks the V L1 voltage signal to determine if a computer is disconnected it is 2.5 V when connected and 0 V when disconnected. Chrimar's own demonstration to the Court at the hearing on Chrimar's objections to the Special Master's R&R confirmed that the Green Book works for this purpose because an alarm sounded when the computer was disconnected.

Finding 30: The fact that later circuitry can also detect the operation of a wrap-back connector (through a 4.3 V signal) does not mean the 650 ohm resistor is not a “detector means”. The 650 ohm resistor is still capable of providing an indication of a change in current flow from 2.5 V to 0 V, which represents a disconnection of a computer. When wrap-back connectors are not used, there are only two possible V L1 voltage levels. In that case, the 650 ohm resistor would operated exactly the same as the resistor R2 if the alarm circuitry of the ‘260 patent preferred embodiment were added downstream.

Finding 31: Green Book does not say that the use of wrap-back connectors is essential; it merely says it is “likely” that a cable with wrap-back connectors will be used. Chrimar produced no testimony from anyone knowledgeable with the creation of the Green Book who claimed the sole embodiment of the Green Book used wrap-back connectors.

Finding 32: Reducing the Green Book to practice and then substituting it for part of the ‘260 patent preferred embodiment to see if that circuit still “works” is not appropriate mode of analysis for anticipation. *Id.* Anticipation must be determined by comparing anticipatory reference to the language of the claim as interpreted by the Court. *Id.*

Chrimar argues that the phrase “selecting respective pairs” in claim 14 should be interpreted as requiring one and only one current loop per piece of monitored equipment, with each current loop having one and only one pair of data communication lines. The preferred embodiment of the ‘260 Patent is consistent with Chrimar’s interpretation. [‘260 Patent col. 3 37:52] In arguing that Foundry’s PoE devices infringe on claims 14 and/or 17, Chrimar reverses its own position outlined above, now claiming that each monitored piece of equipment can have multiple current loops using in total more than a single pair of data communication lines. [Doc. # 199 at 5-7] Thus like Foundry, and for obvious reasons, Chrimar's validity and infringement positions are inconsistent in regards to the number and type of current loops (i.e., differential vs phantom) disclosed by the '260 Patent [Doc. # 205 at 4].

Irrespective of its inconsistent positions, Chrimar is incorrect in asserting that one and only one pair of communication lines can be associated with a current loop and that there must be one and only one current loop associated with each monitored piece of equipment for the following reasons:

(i) The additional limitation proposed by Chrimar does not appear in any of the claim language.

(ii) If this limitation were to apply to method claim 14, it should similarly apply to the corresponding means-plus-function claim 1. The Green Book (Figure A-2, Example 2), however, clearly discloses multiple current loops, which in total utilize two pairs (one transmit pair and one receive pair) of communication lines associated with each piece of monitored equipment. Thus Chrimar is collaterally estopped from arguing that each piece of monitored equipment must have one and only one current loop consisting of one and only one pair of data communication lines, because such an interpretation is inconsistent with the Cisco ruling that found the Green Book (Figure A-2, Example 2) to be prior art that anticipates claim 1.

(iii) According to the Markman order associated with the instant case, the Court has interpreted the phrase "selecting respective pairs" appearing in claim 14 as "Choosing <u>a</u> pair of data communication lines for each associated piece of

> monitored equipment that is different than any of the other pairs associated with other pieces of equipment. The predominant meaning of the term "a" in a patent claim construction is "one or more," not "one and only one." [*Crystal Semiconductor v. Tritech Microelectronics*, 246 F.3d 1336, 1347 (Fed. Cir. 2001); see also *KCJ Corp. v. Kinetic Concepts Inc.*, 223 F.3d 1351, 1356 (Fed. Cir 2000); *Elkay Mft Co. v. Ebco Mfg Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999); *Abtox, Inc. v. Exitron Corp.*, 122 F.3d 1019, 1023 (Fed. Cir. 1997)] This is particularly true when, as is here, the claim is written in the open "comprising" format. [*Crystal Semiconductor v. Tritech Microelectronics*, 246 F.3d 1336, 1347 (Fed. Cir. 2001) ("This court has consistently emphasized that the indefinite articles 'a' or 'an,' when used in a patent claim, mean 'one or more' in claims containing open-ended transitional phrases such as 'comprising.'"].

It is indisputable that the Green Book in Fig. A-2 (example 2) discloses (a) multiple current loops for each associated piece of equipment, (b) with each current loop composed of pairs of data communication lines, and (c) these data communication lines are not associated with any other monitored piece of peripheral equipment. Thus the limitation of claim 14, "selecting respective pairs," is disclosed in the Green Book.

I recommend that the *Markman* order in the instant case be *clarified* to reflect the fact, that (1) there can be one or more current loops per piece of peripheral equipment and (2) each current loop has a pair of transmit wires, a pair of receive wires or one transmit and one receive wire.

Finding 25 in Cisco states "… it (the Green Book) discloses a current loop over a pair of data communication lines that connect a piece of electronic equipment to a network

<u>through</u> existing internal circuitry." Thus the limitation "… forms a current loop **through** the associated pieces of monitored equipment …" is anticipated by the Green Book.

Claim 14 contains the phrase "so as to achieve continuous current flow through while each of said associated pieces of equipment is physically connected to said network by data communication lines; and. " Foundry asserts that the AMD and Green Book describe continuous current flow through each current loop while each of the associated pieces of equipment is physically connected to the network. Foundry does not, however, offer any evidence in its brief to demonstrate that this is true. Ordinarily this failure would be fatal to a motion for summary judgment, since Foundry bears the burden of proof on this issue. Chrimar contends (Doc. 213 at p. 3) in its objection to the Special Masters Report and Recommendation (related to the invalidity and noninfringment of claims 14 and 17) that "..with respect to the invalidity of claim 14, the R&R discusses at p. 21 that Foundry has failed to provide any evidence that the limitation of "achieving continuous current flow" is found within the prior art which should be fatal to any position of anticipation." It is a question of law as to whether Foundry's motion for summary judgment must be denied because of Foundry's failure to provide evidence for something that is *obviously* true. The issue of continuous current flow is discussed next.

Finding 26 of Cisco states "The Green Book uses a 5 volt DC power supply to inject a low DC current onto the data communication lines, which power supply corresponds to input terminal 25 and isolation power supply 26 in the '260 Patent. Hence, there is a source means. To one of ordinary skill in the art, a 5 volt DC power supply means a power supply that produces a <u>constant</u>, <u>unchanging</u>, 5 volts. Combining this fact with the

Cable Detect Implementation Example 2 (Figure A-2 in the Green Book, **see Exhibt 8**) it is evident that a constant current will (i) flow from the center tap of the transformer (3a) at the transmit M-port of the concentrator along data communication lines (1a and 1b) to (ii) the center-tap of the isolation transformer (4a) at the receive S-port of the peripheral equipment to (iii) the center-tap of the isolation transformer (4b) at the transmit S-port of the peripheral equipment to (iv) the center tap of the isolation transformer (3b) at the receive M-port of the concentrator along data communication lines (2a) and (2b) and finally (v) through the 650 ohm resistor (7) to ground, thus completing a current loop along pairs of data communication lines (attached from the hub to the peripheral equipment) and through the peripheral equipment. This current maintains a constant value while the peripheral equipment is connected to the hub, and hence is continuous.

Note that Chrimar in it's objections to the Special Master's R&R contests the assertion that the current flow is continuous in the AMD and Green Book references while the computers are connected to the network. [p. 3, Doc. 213, filed 5/26/11] As evidence it presents a scenario, where the cable connecting the concentrator to the peripheral equipment contains one or more broken wires, thus making it impossible so as to achieve the required continuous current flow through each current loop while said associated pieces of equipment is physically connected to said network via data communication lines. This is a highly contrived example, since the disclosed invention in the '260 Patent implicitly assumes that the cable is not broken and is not improperly connected to either the network or the peripheral equipment. The disclosed invention in the '260 Patent also fails to satisfy claim 14 when the cable contains broken wires and/or is incorrectly connected to the network or the peripheral equipment. It would be obvious to any person of ordinary skill in the art, that the FFDI publications discloses that the current flow is continuous in the AMD and Green Book references while the computers are properly connected to the network and the cable does not contain broken wires. Thus Chrimar's argument is highly contrived, fails to properly represent the operation of the invention, and as such is unavailing.

The term "continuous current flow" was not interpreted either as part of the Cisco ruling or by the *Markman* order associated with the instant case. Not only does this absence affect arguments regarding invalidity, but it may have significant bearing on infringement issues. Based on the common and mathematical meanings of the word "continuous," the intrinsic evidence in the '260 Patent, and the fact that the claim should be given its broadest reasonable interpretation consistent with the description of the preferred embodiment, I would suggest that the Court augment its *Markman* order to include one of the two following interpretations of the term "continuous current flow."

Interpretation 1: A current that does not change from one value to another abruptly or instantaneously.

Interpretation 2: An uninterruptable current, i.e., a current that never goes to zero.

Under either one of the above proposed constructions for "continuous current," or for that matter any other reasonable construction, the FDDI Publications disclose a continuous current flow while the peripheral equipment is properly connected and the cable wiring is unbroken. This interpretation is consistent with the Cisco findings, which Chrimar is collaterally estopped from relitigating.

As far as claim construction is concerned, the Federal Circuit has held that the timing of claim construction is in the discretion of the lower court so long as the court works to avoid "surprise and prejudice" that could accompany a late change to the construction. [*Pressure Products Medical Supplies, Inc. v. Greatbatch Ltd*. (Fed. Cir. 2010)] "While recognizing the potential for surprise and prejudice in late adjustments to the meaning of claim terms, this court also acknowledges that the trial court is in the best position to prevent gamesmanship and unfair advantage during trial. Moreover, this court understands that a trial judge may learn more about the technology during the trial that necessitates some clarification of claim terms before the jury deliberates." [*Pressure Products Medical Supplies, Inc. v. Greatbatch Ltd*. (Fed. Cir. 2010)] Since the phrase "continuous current flow" was never previously construed by this Court, nor was a construction offered by either Chrimar or Foundry, its construction at this time would neither surprise nor prejudice the ongoing litigation.

Claim 14 contains the phrase "sensing said DC current signal in each of said current loops." In the instant case, the claim 14 term "sensing" was construed to mean automatic detection, and thus is consistent with the term "detection" appearing in the corresponding language of claim 1. [Doc. 69 at 6] Furthermore the Findings 27 and 29 of Cisco clearly indicate that the FDDI publications disclose automatic detection of disconnection of the cable.

Even if the prior art did not specifically teach the "art of electronic equipment disconnection monitoring" (as incorrectly claimed by Chrimar (see Doc #194 at 7, filed 11/10/10)), anticipation does not require that prior art reference teach what patent teaches; it only requires that patent claim read on something disclosed in reference, i.e., that all limitation of claim are found in reference or are fully met by it. Each and every element of claim 14 is contained in the Green Book, and hence the Green Book anticipates claim 14 of the '260 Patent.

The Special Master, Professor Lemley, in his Report and Recommendation to the Court regarding issues of invalidity and infringement, concludes, as I do, that every element of claim 14 is contained in the Green Book, and hence that the Green Book anticipates claim 14 of the '260 Patent. [Doc. # 210]

In its initial motion for summary judgment (Doc. 143, filed 09/17/10), Foundry contends that claim 14 of the '260 Patent is also anticipated by IBM's U.S. Patent No. 4, 551, 671. Furthermore in their objection (Doc. 211, filed 05/26/11) to the Special Master's Report and Recommendation to the Court (Doc. 210 at 2, filed 05/02/11) regarding the invalidity of the '260 Patent, "Foundry nonetheless objects to the Special Master's failure to consider the invalidity motion with respect to additional prior art, namely, U.S. Patent No. 4, 551, 671 (the "IBM '671 patent") and its commercial embodiment, the IBM token ring network." It is unnecessary for the Court to reach a conclusion of whether the '671 patent and/or the IBM's Token Ring anticipates claim 14 of the '260 Patent, since a conclusion of invalidity can be reached based on the prior art disclosed in the FDDI publications alone. There may be many other examples of prior art that also anticipate the '260 Patent, but the Court is not required to consider every such piece of prior art that may anticipate the '260 Patent.

The question of anticipation is considered a question of fact, and thus a decision of summary judgment can be made if no genuine issue of material fact exists. *Telemac Cellular Corp. v. JOPP Telecom, Inc.*, 247 F.3d 1316 (Fed. Cir. 2001). A Patent enjoys the presumption of validity, and party (Foundry) seeking to invalidate patent at summary judgment must submit clear and convincing evidence of invalidity that no reasonable jury could find otherwise. Such evidence has been presented, and hence I recommend that Foundry's motion for summary judgment of the invalidity of claim 14 should be GRANTED.

III. Invalidity of Claim 17 '260 Patent

III.A Analysis

Claim 17 is a dependent claim of the method claim 14 and reads:

> 17. The method as defined in claim **14** wherein said existing data communication lines comprise 10BaseT wiring.

In its motion for summary judgment of the invalidity of claims 14 and 17, Foundry makes three primary arguments in support of the invalidity of claim 17. [Doc. 143, filed 9/17/10]

1. The FDDI Publications disclose 10BaseT wiring, and thus claim 17 is anticipated by the FDDI Publications.
2. Even if the FDDI Publications did not disclose 10BaseT wiring, claim 17 is invalid due to obviousness.
3. US Patent No, 4, 551, 671 (the "IBM '671 Patent) anticipates or renders obvious claims 14 and 17.

In my analysis to follow, I will not consider item 3 above, the IBM '671 Patent, since a conclusion of invalidity of claim 17 can be reached based on the FDDI Publications and obviousness without reference to any other prior art.

Contrary to Foundry's assertion, the IBM Type 1 and Type 2 twisted pair shielded wiring disclosed in the FDDI publications is not 10BASE-T Ethernet wiring as specified by the IEEE 802.3i standard as was discussed in section I.C.4. of this report.

IBM Type 1 and Type 2 cabling has an impedance of nominally 150 ohms, while 10BASE-T wiring is required to have a nominal impedance of 100 ohms as specified in the IEEE 802.3i standard. If a 150 ohm cable were to be used with Ethernet 10BASE-T equipment designed for 10BASE-T wiring, the impedance mismatch between this equipment and the wiring would degrade the link performance. Thus the IEEE 802.3i standard requires that the wiring have an impedance of nominally 100 ohms in order to avoid this impedance mismatch. In the instant case, the Court has interpreted "10BaseT wiring as "Twisted pair wiring that meets the electrical and mechanical requirements of the IEEE 802.3.i standard, which includes Category 3 or better wiring."

Chrimar and the Special Master, Professor Lemley, in his R&R to the Court explicitly argue that10BaseT wiring includes both the wires and the connectors specified by the IEEE 802.3i 10BASE-T Ethernet standard. [Doc. 210, filed 05/02/11] I disagree with this position for the reasons given in section I.C.3. of this report. This disagreement, however, has no material bearing on the instant case, because the 100 ohm cable impedance requirement precludes IBM Type 1 and Type 2 wiring from satisfying the IEEE 802.3i standard, whether or not the connectors are considered as part of the wiring.

The declaration of Steve Carlson, an expert witness for Foundry, argues that IBM Type 1 and Type 2 cabling can be used in place of 10BASE-T Ethernet wiring by using an impedance matching device. [Doc. 147-2, filed 10/23/09] This impedance matching device, typically realized using a transformer, can match the 150 ohm impedance of the

IBM Type 1 and 2 cabling to the nominal 100 ohm impedance required by the 10BASE-T IEEE 802.3i specification. Essentially by inserting this device between the IBM wiring and 10BASE-T wiring or between the IBM wiring and a 10BASE-T Ethernet device the 150 ohm impedance of the IBM cabling is "converted" to a nominal 100 ohm impedance. Specifically Carlson states:

> 250. Impedance matching between cables of different impedances is, and was in the 1980's and before 1991, well-known to those skilled in the art. In the IBM Cabling System, Technical Interface Specification, Exhibit 5 at paragraph 7.0 Coaxial Balums and Impedance Matching Devices, several devices are shown to match the 150 ohm IBM Cabling System to 93 ohm co-axial, or 110 ohm Twin-ax.
>
> 251. Synoptics Corp., the maker of LattisNet, for example, offered a device to match the impedance between 100 ohm UTP and 150 ohm STP cable in August of 1991, I am informed by Geoffrey Thompson, who was employed by SynOptics, at that time. This is confirmed on page NTEL00769 of the Truman declaration (Exhibit 79), which is SynOptics price sheet from August 1991 that lists the Model 822 10BASE-T to Type 1 adapter.
>
> 252. This device contained a 100 to 150 ohm impedance matching network (typically transformers) and was, according to Geoff Thompson, manufactured by AMP Inc. (now part of Tyco Electronics). This type of device is still offered for sale by Tyco. Exhibit 6 (Tyco data sheet).

The above statements (i.e., items 250, 251 and 252), however, do not imply that IBM Type 1 and Type 2 wiring is 10BASE-T Ethernet wiring. Analogously, plumbing fittings (i.e., reducers) can be used to connect pipes of different diameters together. This fact, however, does not imply that a 1 inch (OD) pipe is a 1-1/4 inch (OD) pipe. If a customer ordered a 1 inch diameter pipe from a retailer and was sent a 1-1/4 inch pipe instead, the customer would most likely complain to the retailer and return the wrong diameter pipe.

Chrimar is also correct in contending that an impedance matching device based on transformers would render the Green Book inoperable. [pp.2-3, Doc. 213, filed 05/26/11] It is a fact, known for more than 100 years, that a non-time-varying current will not pass from the primary to the secondary winding of a transformer. Therefore an impedance matching transformer, much like the isolation transformers discussed earlier, blocks DC, and thus it would prevent the required flow of DC current in the current loops.

A claim is anticipated under 35 U.S.C. 102 if each and every limitation is found either expressly or inherently in a single prior art reference. [*Cisco*, 318 F. Supp.2d at 491 (citing *In re Paulson*, 30 F.3d 1475, 1479 (Fed. Cir. 1994))] The Green Book discloses each and every limitation of claim 14, but it does not disclose the 10BaseT Ethernet wiring of claim 17. Thus the claim 17 is not anticipated by the Green Book, and therefore invalidity cannot follow from this (Green Book) prior art alone.

Chrimar makes many other assertions that are untrue. [II.A,B and C, Doc. 213, filed 05/26/11] These untrue statements include:

> (1) "Instead the wiring mandated by Green Book employs 150Ω shielded twisted pair (STP) wiring and includes the shielded subminiature D connector at the MIC, specifically a male D connector at the M-Port and a female D connector at the S-Port….The end-to-end shield is critical to satisfy the desired system performance criteria. (62.5MHz/100Mbps)

Green Book at p. 5. Green Book, by its own terms, excludes 10BaseT wiring."

This statement is untrue. The operation of FDDI over unshielded twisted pairs (UTP) of copper wiring at 100 Mbps (bandwidth 62.5 MHz) using 4B/5B NRZI coding has been successfully demonstrated, and in fact is specified in the ANSI X3T9.5 standard. (see Advanced Micro Devices, Publication# 18258 Rev. A, Issue Date Nov. 1993, "Implementing FDDI OVER Copper; The ANSI X3T9.5 Standard," Application Note.) Furthermore, the Green Book is not a standard, and it does not mandate any particular type of cabling. It simply presents one particular interoperable solution for FDDI over copper wiring (CDDI).

(2) "The 4B/5B NRZI coding of the Green Book operates at 62.5 MHZ and does not work over UTP….Allowing a UTP segment, no matter how short, within the end-to-end Green Book STP link removes the end-to-end shield necessary for system performance and violates the mandatory teaching of Green Book requiring STP."

This statement is untrue as discussed in item (1) above.

(3) "The SynOptic adapter referenced in the R&R is used exactly opposite to the way applied in the R&R. The adapter was designed to include a STP segment into a UTP link….No adapter would be used in the reverse manner suggested in the R&R because it removes the end-to-end shield necessary for Green Book to perform data communications. It also does not convert Type 1 cabling to 10BaseT wiring…"

> This statement is untrue. It is well known that impedance matching devices, such as the SynOptic adapter, can convert a cable with an impedance of 100 ohms to a cable with an impedance of 150 ohms just as well as it can convert a cable with an impedance of 150 ohms to a cable with an impedance of 100 ohms. The transformer-based impedance converter is a symmetrical device.

As described in Section I.E. of this report, the network interface card (NIC), which includes the transceiver, implements the physical layer functions of the network. The '260 Patent, however, does not disclose any information about the network interface card (NIC), other than the cable detect function illustrated in Fig. 2 of the '260 Patent. Nor does the '260 Patent specify a particular network type, rather the preferred embodiment simply states "The computer network **10** shown herein is of the conventional type which includes a network file server **18** connected to a network backbone **16**. The computer network **10** may include most any type of backbone such as, for instance, and Ethernet backbone manufactured by Xerox Corporation." ['260 Patent, col. 3 14:19]. Thus the invention disclosed in the '260 Patent could work with any network type in existence at the time of the time the patent was filed (e.g., Ethernet, Token Ring, Copper Distributed Data Interface (CDDI, i.e., FDDI over copper), etc.) provided that the concentrator and the peripheral device were equipped with the appropriate network interface cards (NICs).

In practice, the hub equipment (concentrator) would contain a transceiver on the NIC that would convert binary data streams (i.e., streams of bits) to electrical signals and vice versa. The electrical signals would travel along a pair of transmit (receive) wires to (from) the peripheral equipment. Similarly the peripheral equipment would contain a transceiver connected to the secondary winding of the isolation transformer (52a). The transceiver would be designed to meet the required signaling specifications (e.g., IEEE 802.3i Ethernet 10BASE-T or ANSI X3T9.5 FDDI over copper (CDDI)). The transceiver may also contain the electronics necessary to match the impedance of the electrical cable that connects the hub to the peripheral device. The '260 Patent does not discuss the required transceiver electronics. Thus the phrase "10BaseT wiring" appearing in dependent claim 17, which reads:

> 17. "The method as defined in claim **14** wherein said existing data communications lines comprise 10BaseT wiring."

could just as well been replaced by <u>any</u> type of wiring and/or network without making any other changes in the remaining patent language. The details of the invention, as disclosed in the '260 Patent, are completely independent of the network wiring and the type of network (e.g., Ethernet 10BASE-10 or FDDI over copper (CDDI)).

The Green Book discloses an interoperable solution for replacing the fiber optic link between two concentrators or between a concentrator and a peripheral piece of equipment in a FDDI network with copper wiring. This interoperable solution eventually became part of the ANSI X3T9.5 Standard, which is known as the Copper Distributed Data Interface (CDDI), in 1994.

The Green Book discloses many aspects of the proposed interoperable solution for FDDI over copper wiring. These include (1) cables (i.e., 150 Ω shielded twisted pair wiring), connectors (i.e., 9 pin D connectors), (3) line coding (i.e., NRZI), (4) differential output voltage and jitter, (5) susceptibility levels to interference, (6) signal detect function, (7) cable detect function, etc. Figure A-2 (example 2) in the Green Book, however, discloses all by itself, each and every element, of claim 1 of the ‘260 Patent as was decided by Cisco.

The cable detect function disclosed in Fig. A-2 (example 2) of the Green Book could work with any network type in existence at the time it was published (i.e., Ethernet, Token Ring, Copper Distributed Data Interface (CDDI), i.e., FDDI over copper, etc.) provided the concentrator and the peripheral device were equipped with the appropriate network cards (NICs).

By analogy, consider a patented invention that allows a portable, gasoline-powered, electric generator to use spent cooking oil instead of gasoline as its fuel source. The patent discloses nothing about the generator, which is analogous to the transceivers required by the hub and peripheral equipment in a computer network. In addition, suppose that the patent contains a dependent claim that reads “The method as defined in claim X wherein the appliance to be powered by the cooking oil-fueled generator is a refrigerator.” The patent details themselves are unrelated to the particular appliance that is to be powered by the generator, and the language describing the invention is unchanged if the appliance referred to in the dependent claim (i.e., the refrigerator) is replaced by any other appliance, such as a toaster. Furthermore, the ability of the cooking-oil-fueled, electric generator to power the attached appliance will depend upon the electrical characteristics of the generator, as well as the voltage and power requirement of the appliance (e.g., it’s wattage) and the appliance connector (e.g., 3-prong versus 2 prong plug), but not on the invention itself. A person of ordinary skill in the art of portable gasoline powered generators, would find it obvious to use the patented invention to power any of a host of electrical devices.

It is an indisputable fact that at the time the '260 Patent was filed, 10BASE-T wiring was both well known and commonly employed to provide data communication lines for electronic computer equipment. ['260 Patent 3: 31-37]. Furthermore, one of ordinary skill in the art, having at least basic knowledge of electrical engineering and a familiarity with computer networks, including 10Base-T Ethernet would have found it obvious to combine the invention disclosed in claim 1 of the '260 Patent with 10Base-T Ethernet wiring. Similarly such a person would have found it obvious to combine the invention disclosed by Fig. A-2 (Example 2) of the Green Book with 10Base-T Ethernet wiring.

Finding 32 in Cisco "Reducing the Green Book to practice and then substituting it for part of the '260 patent preferred embodiment to see if that circuit still "works" is not appropriate mode of analysis for anticipation. *Id.* Anticipation must be determined by comparing anticipatory reference to the language of the claim as interpreted by the Court. *Id.*" Thus the appropriate test is not to simply reduce the Green Book to practice, with the IBM Type 1 or Type 2 cables replaced by 10BaseT wiring, and verify that the device still works. "A publication is prior art for what it teaches, not merely for the device it actually describes has having been built." Fig. A-2 (Example 2) of the Green Book, by itself, fully discloses each and every element of claim 14 of the '260 Patent.

In Cisco [318 F. Supp. 2d 476], the Court has stated "Claim 1 of the '260 patent is directed to a system for detecting disconnection of electronic equipment from a computer network. Pieces of equipment are connected to the network through data communication lines such that disconnection can be detected. Claim 1 does not require a specific type of network or enable one to construct a full network; the specification merely states that an Ethernet network can be used. *See* '260 patent, col. 3 II. 17-19. Like the patent at issue in *Constant*, which presumed the existence of software to operate the chip, claim 1 presumes the existence of a network to make the invention work. The patented invention is the system for detecting disconnection from a network, not the network itself. As the Special Master analogized, "there is no more need to teach how to build a network than there would be for a carburetor reference to teach how to make a car or for a home anti-burglary literature to teach how to build a house." The Green Book is at least at the same level of technical detail as the '260 patent and does not need to enable an entire network to anticipate claim 1." This statement is reinforced by Finding 20 of the Court's Memorandum and Order regarding collateral estoppel, which reads: "The only changes needed to implement the Green Book in a working FDDI-over-STP network were the use of STP cables instead of optical fiber and the replacement of the optical transceiver (PMD) in the FDDI NIC with an electrical transceiver (PMD). Green Book fully discloses all of the necessary element to a make a "network" within the meaning of claim 1. *Id.*" Similarly the only changes needed to implement the Green Book in a network, using 10BaseT Ethernet wiring, would be to replace the CDDI NIC (network interface card) with the NIC for the new network and replace the Type 1 or Type 2 IBM cabling with 10BaseT Ethernet wiring and connectors. [Doc. No. 139, filed 8/30/10]

One of ordinary skill in the art, having at least a basic knowledge of electrical engineering and a familiarity with computer networks, including 10BaseT Ethernet, would have found the idea of combining the cable detect function (Fig. A-2, Example 2) disclosed in the Green Book with 10BaseT-wiring, or any wiring for that matter, obvious at the time the Green Book was issued. This follows from the fact that (1) the cable detect function disclosed in Fig. A-2 (Example 2) of the Green Book stands by itself, independent of the type of network or network wiring used, and (2) 10BaseT-wiring was well known and commonly used at the time the Green Book was published.

Synoptics, a company started in the 1980's, successfully marketed a product for Ethernet networking systems in 1985 under the name "LattisNet." LattisNet significantly reduced the cost of setting up Ethernet systems by allowing shielded twisted pair (STP) wiring, rather than more expensive coaxial cable, to be used. Synoptics subsequently extended their system to work on unshielded twisted pair (UTP), 10Base-T wiring. [Declaration of Ronald V. Schmidt, filed 11/22/2002)] In the mid-1980's, SynOptics also developed a method to determine whether the cable between peripheral equipment and the network hub (concentrator located in a wiring closet) was properly connected. This cable status function is very similar to the invention discussed in the '260 Patent. SynOptics developed, manufactured, and sold LattisNet components in the U.S. as early as 1985. A product, Model 3305 UTP Host Module, that supported both unshielded twisted pair, 10BaseT wiring, as well as the link status function was released in 1989. The Model 3305 UTP Host Module monitored the DC current flowing along twisted pairs in a phantom circuit in order to determine whether a SynOptics transceiver was properly attached to the concentrator. By 1988, SynOptics revenues had reached $40.1 million dollars. Thus the cable detect functionality had already been combined with unshielded, twisted pair, 10BaseT-wiring and sold as a commercial product before the '260 Patent was filed. [Declaration of Ronald V. Schmidt, filed 11/22/2002)] Note: R.V. Schmidt was the co-founder of SynOptics, he was not compensated for his testimony in his declaration, and he departed from SynOptics and its successor, Bay Networks, Inc., in 1997.

Under Section 103 of the Patent Act, a person is not entitled to a patent "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art…" 35 U.S.C, 103. Furthermore, "The combination of familiar elements according to known methods" is likely to be obvious when it "does no more than yield predictable results." [*KSR* U.S. at 416] A court should also consider the "common sense of those skilled in the art" to determine whether a combination is obvious in light of prior art.[*Leapfrog Enters., Inc. v. Fisher Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007)]

Obviousness is a question of law based on underlying questions of fact. [*KSR*, 550 U.S. at 406; *Scanner Technologies Corporations v. Icos Vision Sys*, 528 F. 3d 1365, 1379 (Fed. Cir 2008)] These fact questions are: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) secondary evidence of non-obviousness. [*KSR* at 406; *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966); *Ball Aerosol & Specialty Container, Inc. v Limited Brands, Inc.*, 555 F.3d 984, 991 (Fed. Cir 2009)]

A court should not hesitate to grant summary judgment holding patent claims obvious when the content of the prior art, the scope of the patent claim and the level of ordinary skill in the art are not genuinely in dispute. [*See e.g. KSR,* 550 U.S. at 427; *Ball Aerosol*, 55 F.3d at 994, *Leapfrog*, 485 F.3d at 1162. *See also In re Translogic Tech.*, 504 F.3d at 1262 (Fed. Cir. 2007); *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F.3d 1075, 1088 (Fed. Cir. 2008)]

The asserted claims of the ‘260 Patent cover a system for detecting the removal of peripheral electronic equipment by remotely sensing the change of current in a current loop that connects a network hub to this equipment via data communication lines. Each and every limitation of claim 14 appears in a single prior art, the Green Book. The ‘260 Patent does not disclose any physical layer network functions, other than cable detection. Nor does it describe the network interface cards (NIC’s) that are necessary to make a network operational at the physical layer. Thus the ‘260 disclosure is not specific to a 10BaseT Ethernet network and/or 10BaseT Ethernet wiring.

At the time the ‘260 Patent was filed, there were four principle types of deployed computer networks – Ethernet, IBM Token Ring, FDDI and CDDI. At the time the ‘260 Patent was filed, 10BaseT wiring was widely known and commonly used. The Green Book, when taken in its entirety, discloses a cable detect apparatus (Fig. A-2, example 2) to be used together with a CDDI network in order to make FDDI operational over copper wiring. The cable detect apparatus, Fig. A-2 (example 2), however, stands by itself, as a complete entity independent of the wiring or network choice. By itself, it can be used with any type of network, not simply CDDI. Given the wide usage of 10BaseT Ethernet networks and wiring at the time, it would have been natural for a person of ordinary skill in the art (i.e., someone with a bachelor’s degree in electrical engineering and some knowledge of computer networks, such as 10Base-T Ethernet) to combine 10BaseT wiring with the cable detect apparatus shown in Fig. A-2 of the Green Book. Also there would be every expectation that such a combination would work as expected. In fact in 1989, before the ‘260 Patent had been filed, Synoptics released a commercial product that combined a cable detect apparatus with 10BaseT wiring. Therefore claim 17 meets the Graham criteria of being obvious in light of the prior art disclosed in the Green Book and the common usage of 10Base-T wiring at the time. [*Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966)] Therefore, I recommend that the Court GRANT Foundry's motion for summary judgment that claim 17 is invalid.

My letter to Judge Cohn, dated 2/21/12 summarizes my findings as they relate to the invalidity of claims 14 and 17.

III.B. Recommendation of the Special Master, Prof. Lemley

The Special Master, Professor Lemley, reached the same conclusion that I did, namely that claim 17 of the '260 Patent is obvious and hence invalid. [Doc. No. 210, filed 5/02/11]. I believe, however, that his analysis [Doc. No. 210 at 29-30] was unclear at best and perhaps even flawed, Prof. Lemley states:

> "Further the record reflects evidence that even Type I connectors in the Green Book could be readily converted to 10BaseT formats. Exhibit 79 to the Carlson report is a SynOptics price list from 1991 that shows a Type 1 to 10BaseT adapter. Carlson Decl., Ex. B at Ex. 79.
>
> One of skill in the art aware of the Green Book and AMD references then, would know of the existence and prevalence of conventional 10BaseT technology, and would understand that the invention discussed in those references was not limited to Type 1 or Type 2 cabling with wrap-back connectors, but could include straight-through connectors of other types. And they would know how to convert Type 1 cabling to 10BaseT cabling using an adapter. Given these facts, it would be obvious to one of skill in the art to implement the Green Book invention

> using a variety of standard wiring, including 10BaseT wiring. Accordingly, I find clear and convincing evident that claim 17 would have been obvious to one of skill in the art at the time the invention was made." [Doc. No. 210 at 29-30]

It appears that Prof. Lemley's central premise is that IBM Type 1 and Type 2 cabling and connectors could be converted to 10BaseT Ethernet wiring by using an impedance matching cable adapter. As I discussed earlier, however, these adapters are generally transformer-based, and therefore they will not pass a DC current. Hence, they will render the invention inoperable. There is no need, however, for such cable/connector conversion. Fig. A-2 (Example 2) in the Green Book discloses, by itself, each and every limitation of claim 14 of the '260 Patent. Further, he cable detect apparatus, Fig. A-2 (example 2) stands by itself, as a complete entity independent of the wiring or network choice. By itself, it can be used with any type of network and wiring (not simply CDDI equipped with IBM Type 1 and Type 2 cables and connectors) by inserting an appropriate network interface card into the concentrator and into the peripheral equipment. Given the wide usage of 10BaseT Ethernet networks, network interface cards, and 10BaseT wiring at the time of the Green Book, it would have been natural for a person of ordinary skill in the art (i.e., someone with a bachelor's degree in electrical engineering and some knowledge of computer networks, such as 10Base-T Ethernet) to combine 10BaseT wiring with the cable detect apparatus shown in Fig. A-2 of the Green Book.

III.C. Foundry's Arguments for Invalidity of Claim 17

In my opinion, Foundry muddles the waters in a making its case that claim 17 of the '260 Patent is invalid. In its motion for summary judgment [Doc. No. 143 at 15-17, filed

9/17/10], it basically contends that (1) 10BaseT Ethernet wiring was well-known at the time the ‘260 Patent was filed, and (2) IBM Types 1 and 2 wiring disclosed in the Green Book meets the definition (i.e., the Court’s construction) for 10 BaseT Ethernet wiring. Although contention 1 is undisputed, condition 2 is not only disputed, but untrue.

Foundry in its supplemental statement of material facts in support of its motion for summary judgment [Doc. No. 219, Filed 10/14/11] continues this line of argument in Exhibit A Section I (undisputed material facts) item 8. In this section, it makes a number of arguments including (1) the term “wiring” does not include connectors, (2) IBM Type 1 and Type 2 wiring fall within the Court’s construction of “10BaseT wiring,” and (3) 10BaseT wiring was commonly employed to provide data communication lines at the time the invention. Assertion 3 is indisputably true, the truth of assertion 1 is debatable, and assertion 2 is definitely false.

In its response to Chrimar’s supplemental objections to the Special Masters report and recommendation [Doc. 210] that recommended summary judgment of invalidity of claims 14 and 17, Foundry finally proffers the correct argument for invalidity [Doc. No. 219-4 at 4, filed 10/14/11]:

> “Moreover, the relevant teaching of the FDDI Publications is the cable detect circuitry, *not* the data communication system implemented as a whole. Chrimar’s objections therefore fail to raise a genuine dispute as to whether one of ordinary skill in the art would or could use that cable detect circuitry in a network using 10BaseT wiring (UTP or otherwise). Chrimar’s overarching objection to the R&R finding that claim 17 is invalid focuses on whether the complete system described in the FDDI Publications can be modified to operate over UTP wiring-

> that focus is simply *irrelevant* to whether the cable detect circuitry taught in those references could have been obviously implemented in a network using 10BaseT wiring. … As the Special Master correctly observes, '[a] publication is prior art for what it teaches, not merely for the device it actually describes having built.'"

As outlined earlier, it is my contention that one of ordinary skill in the art would have found it obvious, at the time of the invention, to combine the cable detect circuitry shown in Fig. A-2 (example 2) of the Green Book with 10BaseT Ethernet wiring. Thus claim 17 of the '260 Patent is invalid.

<u>III.D. Chrimar's Arguments Against a Motion for Summary Judgment of Invalidity of Claim 17</u>

In a series of briefs, including [Doc. No. 213, filed 05/26/11; Doc. No. 214, filed 07/05/11; Doc. No. 220, filed 10/24/11], Chrimar raises objections to both the Special Masters report and recommendation [Doc. No. 210] regarding the invalidity of claims 14 and 17 of the '260 Patent, and to Foundry's assertions in support of invalidity. Its principal arguments are as follows:

> (1) the Green Book does not disclose 10BaseT Ethernet wiring, (2) the Green Book cannot operate on 10BaseT wiring, (3) transformer-based impedance matching cable adapters render the Green Book inoperable, (4) Foundry has not proffered any evidence that the Green Book achieves continuous current flow, (5) Green Book mandates a shielded twisted pair link to function, and (6) the Green Book mandates wrap-back IBM Data Connectors (IDC).

As indicated in my report, assertions 1, 3 and 4 above are true.

As noted earlier, however, it is obviously true that the Green Book achieves continuous current flow, but Foundry failed to make this point in its initial brief.

Assertions 5 and 6 above are untrue, since the Green Book does not mandate anything, it simply presents an interoperable solution for using copper wiring with FDDI.

In regards to assertion 2 above, it *may* be true that if one were to take the Green Book in its entirety, then it cannot operate using 10BaseT wiring. As Foundry has pointed out, however, Chrimar is missing a crucial point in raising argument 2. Specifically, "Chrimar's overarching objection to the R&R finding that claim 17 is invalid focuses on whether the complete system described in the FDDI Publications can be modified to operate over UTP wiring-that focus is simply *irrelevant* to whether the cable detect circuitry taught in those references could have been obviously implemented in a network using 10BaseT wiring. … As the Special Master correctly observes, '[a] publication is prior art for what it teaches, not merely for the device it actually describes having built.'" [Doc. No. 219-4 at 4, filed 10/14/11]. The cable detect circuitry shown in Fig. A-2 (example 2) of the Green Book, by itself, discloses each and every limitation of claim 14 of the '260 Patent. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to combine the cable detect circuitry shown in Fig. A-2 (example 2) of the Green Book with appropriate network interface cards (NICs) to realize the cable detect function of claim 17 using 10BaseT Ethernet wiring.

IV. Infringement of the '260 Patent Claims 14 and 17 by Foundry PoE Devices

I was not directed by the Court to consider Foundry's motion for summary judgment of noninfringement of claims 14 and 17 of the '260 Patent (Doc. 168, filed 09/17/10). Both issues of noninfringement and invalidity of '260 Patent, however, appear in many of the documents related to this case. Having read these documents, I have come to appreciate several important aspects of the noninfringement case. I hope that the following observations and recommendations will be useful to this Court.

Power over Ethernet (PoE) is a technology to power peripheral devices on a network using the Ethernet copper wiring that connects the peripheral device to a network switch or hub. The network switch provides the power to the peripheral device and the switch is generally referred to as the power sourcing equipment (PSE), while the supplied peripheral device is called the powered device (PD). When the PSE is a switch, it's called an endspan. It is also possible to insert a PSE between a non-PoE capable switch and a peripheral PD, in which case the inserted PSE is called a midspan. The specifications of PoE are given in the IEEE 802.3af standard that was issued in 2003. **(see Exhibit 10)**

Endpoint and midspan diagrams are illustrated in Fig. 33-4-PSE location overview (p. 30, IEEE-802.3af). **(see Exhibit 10)** Note that all of these configurations have 4 twisted wire pairs of copper cabling. In alternative A, only two pairs (a transmit and a receive pair - 8P8C connector pins 1,2 & 3,6) are used, much like the phantom loop described in the FDDI Publications (Fig. A-2, Green Book), while the other two pairs of transmit and receive lines (connector pins 4,5 & 7,8) are unused. In alternative B, power is provided along the two pairs of the lines (connector pins 4,5 & 7,8), while data is carried along the other two pairs (connector pins 1,2 & 3,6). Since the lines carrying the DC power signal (connector pins 4,5 & 7,8) are never used for data in this configuration, the condition of claim 14, namely, that a DC current loop, consisting of a pair of data communication lines forms through the associated equipment is not satisfied.

Thus PoE equipment, operating in configuration B, does not infringe on claims 14 or 17 of the ‘260 Patent. The Court also reached this conclusion in Cisco. The same argument applies to midspan PSE. Thus only endspan devices using configuration A could possibly infringe claims 14 or 17.

Chrimar accuses several of Foundry’s PoE PSE [1] of infringing on claims 14 and 17 of the ‘260 Patent. Three of the main issues in dispute are:

(1) whether or not each peripheral device can have more than one current loop and whether or not the pair of data communication lines comprising the current loop can consist of a pair of data lines, one of which is a transmit line and the other of which is a receive line.

(2) whether the accused devices supply a DC current signal to each current loop so as to achieve continuous current flow through each current loop while each of said associated pieces of equipment is physically connected to said network via the data communication lines

(3) whether the accused devices sense said DC current signal in each of said current loops so as to detect a change in current flow indicative of disconnection of one of said pieces of associated equipment.

Issue 1 was answered in the affirmative in the Cisco case, and Chrimar is estopped from relitigating this issue here.

According to the IEEE 802.3af standard for PoE PSE, there are three phases, detection, classification, and powering, that these devices go through when they are connected to a peripheral device. They first detect the presence of the PD peripheral device (detection), then determine the power requirements of the PD (classification), and finally they power the PD device (power phase), provided the first two phases are successfully completed. Once phase 3 has commenced, I believe that it is undisputed that a "continuous DC current flow is achieved…while each of the associated pieces of equipment is physically connected to said network," as claim 14 requires. Foundry claims that because continuous current flow does not occur until the power phase has been initiated, its PSE devices do not satisfy the continuous current flow requirement of claim 14. Chrimar in response argues that there is always some current flowing during the first two phases, and thus continuous current flow is achieved whenever the PSE and PD are physically connected. Since I was not asked by the Court to study the accused infringing devices, I am not in a position to render an opinion as to whether Foundry's devices draw some current whenever they are connected to a peripheral device.

Once a valid PD has been detected, classified and powered, the PSE uses the maintain power signal (MPS) to determine whether to remove power from the PD because it has been disconnected. **(see Exhibit 10)** There are two types of MPS – DC MPS and AC MPS. The PSE may optionally monitor the AC MPS only, the DC MPS only or both the AC and the DC MPS. If a DC MPS signal is used, then the PSE monitors this signal to see whether the PD continues to draw at least 10 mA for at least 60 ms out of every 400 ms time interval. If the AC MPS signal is used, then a sinusoidal AC signal of maximum frequency 500 Hz and maximum current 5 mA, is injected into the data communication lines (endspan PSE in configuration A). The PSE measures the AC voltage that is associated with the AC MPS signal, and computes the impedance from this voltage and the injected current. When the AC impedance is greater than or equal to 1980 KΩ (indicating a disconnection of the PD), the PSE will stop supplying power to the PD. **(see Exhibit 10)**

Foundry argues that all, but one, of its devices uses the AC MPS technique to detect peripheral equipment disconnection, and thus these AC MPS-based PoE devices do not meet the requirements of claim 14 of "sensing said DC current signal in each of said current loops so as to detect a change in current flow indicative of disconnection." Although the Special Master, Professor Lemley, disputes this argument, I believe that Foundry is correct in its assertion.

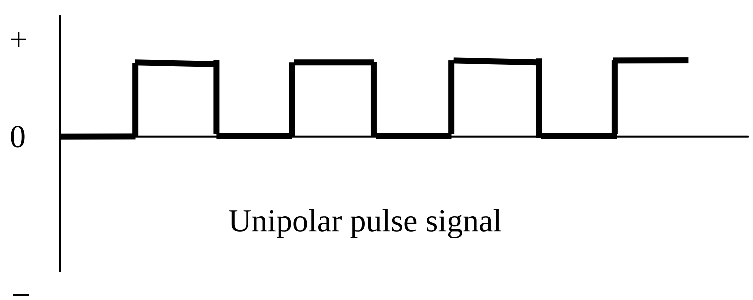
Resolving this issue requires one to understand the meaning of a DC signal. The *Markman* hearing in the instant case interpreted the phrase "DC current signal" to mean a "A flow of current in only one direction". Although this may be the correct interpretation when considering electric machinery, it most certainly is not the correct interpretation when the applications involve electronics. <u>A current that flows in only one direction is *unipolar*, but not necessarily DC.</u> This point is nicely put by Foundry's Expert Witness, Rich Seifert, in his declaration (Doc. 205-12, filed 12/22/10) :

> 42. Chrimar has offered a definition of "DC current signal" as an "an electrical current signal having a characteristic propagation through a current loop with no reversals in current flow as opposed to an AC current signal." That is, they tie the innate meaning of the term to the fact that DC current does not change in

direction. This is logically incorrect, as the lack of reversals in current flow is a *necessary*, but not *sufficient* condition for direct current.

43. To one of ordinary skill in the art, a DC signal is a constant (unchanged and unchanging) value of current. Exhibit 6 at 49-50. ("The direct current (dc signal) can be defined mathematically by $i(t) = K, -\infty < t < +\infty$. Here K is any nonzero number."[6]) While it follow logically that a DC current never change direction (since that would require a change in the value of the current from a positive to a negative level, or vice-versa), the lack of reversals per se is not sufficient to characterize a signal as being DC. A signal, whose direction never changes is referred to as *unipolar* (one polarity, either plus or minus), not DC.

44. A signal can be unipolar and not comprise direct current, as shown in the figure below. The depicted signal never changes direction; the current level is always positive or zero, and never negative. However, the signal is not DC, since its value varies over time.[7] Thus, to one ordinary skill in the art, the depicted signal is not a DC current signal under a proper construction of the claims of the '260 patent."



Unipolar pulse signal

[6]In practice, the current starts flowing when the equipment is powered up and the

circuit is established, and stops when the circuit is opened or the equipment is turned off. Engineers consider a signal to be "DC" if it remains constant over a long period of time (relative to the nature of the circuit application).
[7]Strictly speaking, the depicted unipolar pulse can be said to have a DC component (equal to the average value of the current in the positive direction), and an AC component (corresponding to the alternating high and low values seen as if they were symmetrical around zero). The complete, composite signal comprises the *superposition* (summation) of the DC and AC components. Indeed, every signal which is not either constant for all time (DC) or symmetrically varying around zero for all time (AC) is created by the superposition of its average DC component, and its AC components (at every frequency).

In light of the above facts, I would recommend that the Court revise its interpretation "DC current signal" to read as follows:

> An ideal DC signal is a signal that remains constant over all time. In practice there are no ideal DC signals, so a DC signal should be interpreted as a signal that remains constant over a period of time that is long compared with the nature of the application.

This interpretation is further born out by the intrinsic evidence in the '260 Patent where specific numerical values are given in the preferred embodiment for the DC voltage (i.e., 5 V) and DC current (i.e., less than 1 milliamp). Time-varying signals cannot be specified by a single numerical value, and thus these (DC) signals must be assumed to be constant.

"

As noted early, as far as claim construction is concerned, the Federal Circuit (*Pressure Products Medical Supplies, Inc. v. Greatbatch Ltd*. (Fed. Cir. 2010)) has held that the timing of claim construction is in the discretion of the lower court so long as the court works to avoid "surprise and prejudice" that could accompany a late change to the construction. I do not believe that the proposed change in the construction of the claim term "DC" introduces any unfair surprises in the instant case.

The AC MIPS signal described by the PoE IEEE 802.3af standard is a low frequency RF (sinusoidal) signal that is injected into the communication lines together with the DC power signal and the data. The frequency of this AC MIPS signal is low enough not to interfere with the data communications, and the absence of this signal, as detected at the hub, indicates that the peripheral equipment has been disconnected.

For the reasons given above, the AC MIPS signal, as specified by the IEEE 802.3af standard, added to the DC power signal is a unipolar signal, but not DC. Thus any PoE device that uses the AC MIPS technique to determine the disconnection of the peripheral equipment does not literally infringe on claim 14 and/or 17 of the '260 Patent. Furthermore no midspan PoE device infringes, either literally or by equivalents on claims 14 and/or 17. Finally an endspan device that utilizes DC MPS to detect disconnection MAY infringe on claims 14 and 17 (either literally or by equivalents), but I have yet to reach a conclusion on this point.

The doctrine of equivalents in patent infringement cases is applied to individual claim limitations and not to the invention as a whole. In *Warner-Jenkins Co. v. Hilton Davis Chem, Co.*, 520 U.S. 17 (1997), the legal test is whether the difference between the limitation in the accused device and the limitation literally recited in the patent claim is "insubstantial." A three-prong test for infringement by equivalents is whether:

The accused infringing device

(1) performs substantially the same function

(2) in substantially the same way

(3) to yield substantially the same result.

Graver Tank & Manufacturing Co. v. Linde Air Products Co., 339 U.S. 604 (1950). The AC MIPS technique, used by many of Foundry's PoE devices to determine the disconnection of the peripheral equipment, satisfies the first and third prongs of the above test, namely it performs the same function and yields the same result as detecting a change in the current disclosed in claim 14 of the '260 Patent. However, it does so, in a manner that substantially differs from that disclosed in the '260 Patent, and thus fails to meet the second prong of the test.

The AC MIPS technique requires the injection of a sinusoidal signal into the data communication lines, in addition to the DC signal injected to power the peripheral device. In the prosecution of the '260 Patent, the patentees filed an amendment in response to the Examiner's Office Action mailed December 22, 1993. On page 10 of this amendment (**see Exhibit 12**), the patentee's write "Likewise, Claims 1 through 4,9 through 11 and 16 through 18 were rejected under U.S.C. 102(e) as being anticipated by Lee et al. The Lee et al reference generally discloses an electronic equipment anti-theft monitoring system which injects an RF current into the power supply lines of the electronic equipment. The Lee et al system, according to one embodiment, utilizes front-end noise suppression mounted across the power lines with the electronic equipment to provide a return path for the injected RF current. According to another embodiment, Lee et al teaches coupling of an RF current return device in lieu of the use of existing fron end noise suppressors to provide the RF current return path. In any event, Lee detects a disconnect of the electronic equipment from the power supply lines when the returned injected RF current is not detected by a detection circuit.

This is in contrast to Applicant's claimed invention which requires a low DC current signal supplied to the communication lines such as those employed by an ethernet network."

In submitting this amendment, the patentees limited the scope of their claimed invention to disconnection techniques that rely on the monitoring the continuity of an injected DC signal, and expressly do not include techniques that rely on the injection of sinusoidally-varying signals. The doctrine of equivalents is limited by prosecution estoppel. Thus if a patentee abandoned, through an amendment of the patent application, certain literal claim coverage (such as the use of non-DC signals for disconnection detection), then the patentee is estopped from later arguing that the abandoned coverage is insubstantially different from the literal claim limitation (*Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, U.SS. 722 (2002)). Thus any of Foundry's PoE devices that uses the AC MIPS technique to determine the disconnection of the peripheral equipment does not infringe, either literally or by equivalents, on claim 14 and/or 17 of the '260 Patent.

V. Conclusions

(1) I recommend that the Court's *Markman* order in the instant case should be revised, clarified and/or supplemented as follows:

	Term	Court's Intrepretation	Recommended Changes
7	DC current signal	A flow of current in only one direction.	An ideal DC signal is a signal

			that remains constant over all time. In practice there are no ideal DC signals, so a DC signal should be interpreted as a signal that remains constant over a period of time that is long compared with the nature of the circuit application.
4	current loop	A round-trip path through a selected pair of data communication lines and an associated piece of equipment.	A round-trip path through a selected pair of data communication lines and an associated piece of equipment. There can be one or more current loops per piece of peripheral equipment and each current loop has a pair of transmit wires, a pair of receive wires or one transmit and one receive wire.
New	continuous	Not interpreted.	Interpretation 1: A current that does not change from one value to another abruptly or instantaneously.

			Interpretation 2: "An uninterruptable current, i.e., a current that never goes to zero." Note: Either of these two proposed interpretations would be fine, and both would result in the same decision regarding invalidity and noninfringement.

(2) I recommend that the Court should rule that10BASE-T Ethernet wiring is NOT equivalent to IBM Type I and Type II cabling.

(3) It is my recommendation that the Court should rule that claim 14 of the '260 Patent is invalid by anticipation of the prior art, i.e., the FDDI Publications.

(4) I recommend that the Court should not rule on whether the IBM '671 Patent invalidates claims 14 and/or 17 of the '260 Patent by anticipation, since such a ruling is unnecessary to decide invalidity of either claims 14 or 17.

(5) I recommend that the Court should rule that dependent claim 17 of the '260 Patent is invalid by obviousness.

(6) I recommend that the Court should rule that any midspan, power over Ethernet (PoE), power sourcing equipment, that is compliant with the PoE IEEE 802.3af standard, does not infringe, either literally or by equivalents, on claims 14 and/or 17 of the '260 Patent.

(7) I recommend that the Court rule that any endspan, power of Ethernet (PoE), power sourcing equipment, that is compliant with the PoE IEEE 802.3af standard, does not

infringe, either literally or by equivalents, on claims 14 and/or 17 of the ‘260 Patent if it uses the AC MPS technique to detect disconnection.

(8) I recommend that the Court determine whether endspan, power over Ethernet (PoE) power sourcing equipment, that is compliant with the PoE IEEE 802.3af standard, infringes on claims 14 and/or 17 of the ‘260 Patent if it uses the DC MPS technique to detect disconnection.

(9) I recommend that the Court determine which of Foundry’s devices, that are accused of infringing claims 14 and/or 17 of the ‘260 Patent are (1) compliant the IEEE 802.3af PoE standard, (2) are endspan power sourcing equipment, and (3) use the AC MPS technique to detect disconnection. This determination, together with (6)-(8) above will allow the Court to determine which, if any, of Foundry’s accused devices infringe claims 14 and/or 17 either literally or by equivalents.

Footnotes

[1]. SuperX series (“SX”) switches, FastIron Edge X series (“FESX”) switches, FastIron series (“FES”) switches, FastIron GS series (FGS264 and FGS648) switches, JetCore PoE modules (J-824E-POE and JF24E-POE), and the FGS-24GCPOE (DIMM Module) (Doc. 168 at 7).

[2]. “After consideration of Plaintiff’s brief in support of motion, defendants’ response and plaintiff’s reply, the Court is satisfied that the decision on the motion at the present stage of the case is premature. It appears that the Court is being asked to make a ruling which may materially impact the issue of infringement in circumstances where it knows nothing of the accused devices. Accordingly, decision on the motion is STAYED until such time as the nature of the accused devices are fully explicated on the record…” (Doc. 76, filed 10/02/08)

[3]. Collateral estoppel does not attach when two alternative grounds for a ruling are stated, each of which is sufficient to sustain the outcome, because neither such basis is necessary to the outcome. This issue is now mute, since in the instant case, the Court has issued a *Markman* order that defines “data communication lines” as “communication lines typically used for carrying data.”

[4]. The special master, Prof. Lemley, visited this issue in considerable depth in his Markman hearing report and recommendation to the Court (see pp. 7-12 in Doc. 53, filed 04/01/08). As stated by Prof. Lemley “…if the claim stands on its own as a structurally complete description of the invention without the inclusion of the preamable, the preamble will ordinarily not be limiting.” Furthermore the “Fact that the preamble is used only to “state a purpose or intended use for the invention” is strong evidence that the preamble is not limiting.” Although a strong case is to be made that the patentees conceived their invention as a means to preventing theft or the authorized removal of computer equipment from a network, the Cisco Court ruled that the claimed invention is not limited to anti-theft systems described in the patent specification. According to Prof. Lemley, “The Federal Circuit has repeatedly cautioned against reading limitations from the patent specification into the claims.” Thus, we adopt the same position in the instant case that the term “anti-theft” found in the patent specification is not limiting on claims 14 and 17 of the ‘260 Patent claims.

[5]. In the context of data networking equipment, a transceiver is a an electronic or optoelectronic device that converts a string of data bits into a corresponding sequence of electrical or optical signals that are transmitted over electrical wires or optical fibers. Transceivers can also be designed to operate in the reverse direction, converting electrical or optical signals back into strings of data bits. Transceivers serves as an interface between the data (in the hub or peripheral equipment) and the electrical cabling or optical fibers that connect the hub to the peripheral equipment.

[6]. A cable consists of individual wires or wire pairs, along with insulation and shielding, and a protective shell. Sometimes we will use the word "cable" and "wiring" interchangeably when the difference is unimportant.

[7]. Electrical transceivers convert binary data streams (i.e., binary bit streams) to electrical signals that are transmitted over the data communication lines and vice versa. Optical transceivers convert binary data streams to optical signals that are transmitted over optical fibers rather than wires.

This is the third draft version of my report and recommendation to the Court regarding the invalidity of claims 14 and 17 of the '260 Patent. The first version of this report was completed on January 18, 2012 and subsequently modified on February 12, 2012. The third version is dated March 18, 2012. Although the general content of all three versions is similar, I have continued to correct errors, improve the readability of the document by including additional background information, and add additional arguments to refute some of the positions taken by the litigants.

Dated: March 18, 2012

Respectively submitted

s/Kim A. Winick
Kim A. Winick
Expert Advisor
Professor, Univ. of Michigan